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AGRICULTURAL ECONOMICS AND SOCIOLOGY

# MONTHLY BULLETIN
OF
# AGRICULTURAL ECONOMICS AND SOCIOLOGY


## WHITE SETTLEMENT IN THE TROPICS

by Dr WALTER BALLY

SUMMARY: I. Introductory. – II. Some facts from the history of white colonization. – III. Effect of climate: acclimatization: diseases. – IV. Economic problems.

### I. – Introductory.

Can whites succeed as small farmers in the tropics? In many overpopulated countries of Europe this problem is of primary importance today. Attention is being turned to enormous areas of land suitable for cultivation which only need to be cleared and which could then be colonized by the surplus rural population of temperate countries.

First it is necessary to define the nature and scope of the problem.

The first point is the definition of tropical regions. The parallels of latitude of 23 1/2° north and south bound the mathematical tropics, but even along the equator many plateau areas have a temperate climate. On the other hand outside the tropical zone there are certain lowland areas where owing to the influence of warm ocean currents or hot winds the climatic conditions are similar to those prevailing in hot countries. An attempt has been made, therefore, to take temperature as a criterion. The geographer SUPAN suggested the mean annual isotherm of 68° F as a suitable boundary for the tropics, KOPPEN differed slightly, suggesting the isotherm of 68° F for the coolest month, he later extended his definition to include zones where the mean temperature of the coolest month is over 64.4° F. A. GRENFELL PRICE, author of a work which will be frequently cited in this article, agrees with AUSTIN MILLER and ELLSWORTH HUNTINGTON who defined the tropics by the mean annual isotherm of 70° F.

In this study, the definitions of KOPPEN, internationally adopted, will be followed, and the tropical mountainous areas which, in recent years, have often been considered as regions suitable for white settlement will be included. The regions in question are situated in the climatic zones defined by KOPPEN as follows:

zone A f (A. Mean temperature of the coolest month below 64.4° F, f: climate humid throughout the year),

zone A w (savannah zone, w: dry period during winter),

zone B S (steppe zone, B: mean annual rainfall in cm. above the limit 2 t, t being the mean annual temperature in centigrade);

zone C w i (warm climate with a dry period during winter, C: mean temperature of coolest month above 64.4° F, i: maximal difference of less than 5° C between the coolest and the warmest month); lastly

zone C f i.

All these differences have to be taken into account, the tropical climate being far from uniform as is frequently assumed in Europe.

The term 'white man' is used in a broad sense and comprises white races of Northern European as well as those of Mediterranean origin. It may be noted, by the way, that many of the problems treated in this study also apply to Japanese emigrants to the tropics.

This article proposes to deal with the white 'colonist', that is, the settler who desires to cultivate the land himself, assisted by his family. Therefore, it excludes white managers and assistants of plantations where all manual labour is carried out by the natives. The problem of acclimatization for estate managers and assistants is quite different from that regarding the colonist. The former enjoy many advantages--hygienic housing, suitable diet, regular leave to Europe, possibility of returning to Europe after twenty years' service, etc.—advantages which the colonist can never have. The difference between permanent colonization and temporary occupation is very wide; it is not only question of the manual work of the colonist compared with directing work of other categories of Europeans; planters, Government officials, soldiers, engineers, etc.

These three definitions—tropical regions, white man, colonist—suffice to indicate the scope of our discussion

First, early attempts at white settlement are described. Subsequently, the favourable and unfavourable factors which led to the success or failure of colonization efforts are examined. These factors are divided into two categories: (1) factors influencing the physical condition of the settlers; (2) economic factors.

There are two aspects to the problem of white settlement: it is sought on the one hand to provide a good opening for the surplus white rural population and, on the other hand, to achieve a fuller utilization of uncultivated or insufficiently exploited land. History shows that it is a mistake to suppose that the so called 'superiority' of the white race guarantees a rational working of the land. On the contrary, the white race has only too often destroyed fertile soils, ruining the land through the use of unsuitable methods of cultivation. The primary object of the Governments of tropical and other countries where there are still areas suitable for clearing and colonization, therefore, should be directed not only to immigration and settlement of colonists, but also towards the effective utilization of the land, using methods adapted to the local climatic conditions and not simply copying those employed in the mother country.

The competition of native agriculture is a limiting factor in all countries where the latter is widespread. Illusions on this question are useless; any attempt to establish white colonists by the side of the native peasants, trouble is inevitable.

The excellent work of A. GRENFELL PRICE entitled 'White settlers in the Tropics' is the chief source of information used in this article. It is the first comprehensive work on the subject and written by a scientist who studied the problem on the spot in Australia, in the West Indies and in the subtropical regions of the United States Mention may also be made of a brochure by C J J VAN HALL who went to the heart of the matter by studying and analyzing concrete cases The work of J GROBER comprises, as the author himself admits, more 'conjectures and possibilities than definite facts'. It regards the white man in Africa and South America, consequently in regions not entirely tropical, also the subject is not treated from the aspect of the white man as an agricultural colonist only. Taking into account these limitations, this work supplies very interesting information

The International Geographical Congress held at Amsterdam in 1938, placed the subject of white settlement to the fore in the program of the Section of Colonial Geography. The well arranged volume of transactions comprises 42 reports contributed by geographers, medical men, engineers, agronomists and Government officials '*Tot capita quot sensus*'. Mevrouw VERKADE-CARTIER VAN DISSEL has admirably acquitted herself of the thankless task of collecting and assembling these often contradictory contributions on the subject. The documentary value of the proceedings of this Congress and of the general report is unquestionable

In the course of this article other sources of information will be cited, though we cannot pretend that our bibliography is complete In some cases, owing to present circumstances, it was impossible to have recourse to original data. The author of this study, however, would not have ventured on his task if he had not spent eleven years in a tropical country -Java where he experienced the effect of the different climatic conditions prevailing in zones of altitudes from 0 to 3000 metres

The author is fully aware of the complexity of the problem approached and of the fact that our present ignorance is greater than our knowledge of the subject. To quote ALEXIS CARRELL, 'Man is an indivisable entity of extreme complexity. A simple conception of man is impossible'.

## II. — Some facts from the history of white colonization.

Following the important geographical discoveries of the XVIth, XVIIth and XVIIIth centuries, Portuguese, Spaniards, English, French, Dutch and Danes turned their attention towards the unknown tropical regions. For VASCO DE GAMA the goal was 'Christians and spices'. Trade and religious conversion were the primary aims of the conquerors.

The idea of white settlement, however, was not entirely foreign to the famous explorers of that period. In 1633, JAN PIETERSZ COEN, founder of Batavia, and one of the most eminent colonizers of the time, when on leave in Holland, suggested to the States General that the surplus population already existing in Holland at that time should be transferred to the East and West Indies. His object, it is true, was rather to establish colonies of free traders

working in collaboration with the East India Company than permanent white agricultural settlements. The suggestion of COEN, however, was not acted upon. Here, as in the Asiatic possessions of the other European nations, the native population was much too dense to permit agricultural immigration of any kind.

The position was quite different in tropical America. At the time of its discovery by Europeans, the natives were centred chiefly in the islands and plateaux, regions where the climate was also suitable for white settlers. The Indians were soon subjugated or exterminated. Within a short time, it was found necessary to recruit manual labour from other countries. The importation of negro slaves had already begun in the XVIth century. To cite an example:

In 1508, when the Spaniards began the occupation of the Island of Puerto Rico, the Indian population was estimated at about 80,000. The Indians were as 'thick as bees' and the Island 'blossomed like the rose'. As early as 1515, Licenciado SANCHO VELASQUEZ wrote to the King of Spain: 'Excepting your Highness' Indians and those of the crown officers there are not 4,000 left'. The census of 1531 lists the following population: 57 Spaniards married to whites, 14 Spaniards married to Indians, 298 single Spaniards, 675 Indian and 1523 negro slaves. By 1582 the Borinquen Indians were extinct.

Subsequently, the number of negro slaves formed a very high percentage of the population and in many cases they carried out all agricultural work.

In most cases, the different races mixed. This phenomenon will be discussed further on in the article; it may be noted, however, that the Republics of Central and South America make no distinction whatsoever between the different races in their census. Thus all data available on this subject are only approximate. The prevailing conception is that from the melting pot of peoples will be formed, or has already been formed, a new South-American race which, owing to the survival of the fittest, will become the ethnic element best suited for the peopling of the Continent.

This is not the place to discuss this question, which had, however, to be mentioned in order to show the enormous difficulties with which, in Latin America, research work on this subject has to contend. Readers, therefore, will understand the reason for the absence of precise data which would otherwise have been given.

Negro immigration in the XVIth and XVIIth centuries was not sufficient to meet all labour requirements. Particularly in the West Indies, there was still room for white immigrants. It is here that today the last traces of this early colonist settlement are to be found; its vicissitudes are interesting to follow.

The discovery of the West Indies by CHRISTOPHER COLUMBUS was followed by a great wave of immigration. In 1502, there were 12,000 Europeans in the island of Haiti. The French were in the field before the middle of the XVIth century. They were followed by the Dutch and Flemish.

Between 1625 and 1637, French and English colonists poured into the islands. The first immigrants were people of good type obliged to leave Europe owing to religious and political persecution. At first, the English like the Spaniards,

employed Indian labour, but the Caribs soon died out under slavery, and the estate owners turned to white labour and to negroes.

White servants came from three sources: rebellions, kidnapping, and indentures. In most cases they were put on the same footing as slaves. Contemporary writers even expressed the opinion that the negroes were better treated than the white servants. A negro slave was a permanent possession and it was to the advantage of the owner to keep him in good condition. On the other hand, the white labourer was employed only for a certain period, at the end of which he was paid the stipulated amount of sugar. Unscrupulous owners did not hesitate to underfeed and ill-treat white labourers so that they would not last out their indenture.

The rumours of the treatment being so hard discouraged further emigration from England, especially as, at this time, North America became easily accessible and absorbed the flow of immigrants. GRENFELL PRICE also points out a series of other factors which contributed to the decline of the white labourer and small planter-class, and, in particular.

(1) low type of immigrant;

(2) harsh and cruel treatment meted out to the white labourer;

(3) numerous wars and frequent buccaneering which ruined the economic life of the Islands and gave them a bad reputation;

(4) soil exhaustion. It is remarkable that already in the XVIIth and XVIIIth centuries, it was noted that the soil was being exhausted by intensive white settlement. There was no longer any room for the small settler who could not afford expensive fertilizers. Heavy taxes, costly provisions, high risks and the low prices for produce all contributed to the ruin of the small planter. During the XVIIth century, some 1,200 former landowners left Barbados for other parts. The same tendency was observed in Antigua and Jamaica and everywhere, the large landowner ousted out the white settler.

(5) diet, housing and clothing were inadequate. No attempt was made to meet the requirements of tropical conditions. At this period the same mistakes were made in all European colonies. The diet of the rich was excessive and contained much meat, while the poor had a very inadequate diet. European clothing was worn; the English women of the wealthy class in the West Indies followed the London winter fashions which arrived in the Islands at the beginning of summer. The houses were badly built, damp and unwholesome. To all these evils was added the abuse of alcohol, which probably killed off more people than disease;

(6) the negro. Here is the chief factor. From the moment when the importation of black slaves became preponderant, the small planters and white labourers were no longer able to make a living. They had not the energy to enable them to compete with negro labour in the field. The negroes became superior to the white even as artisans. This situation led to the poor-white and the half-caste. The white living in close contact with the black is exposed to many diseases to which he succumbs and to which the black is resistant. Mention will be made later on of the white colonies which have remained pure through several centuries;

(7) diseases. It is impossible to ascertain their true extent in the past. It is certain, however, that it was very considerable. Out of 19,676 soldiers sent to the West Indies in 1796, 17,173 died within five years. With the complete lack of hygiene and the appalling ignorance on tropical diseases, epidemics soon reached an alarming extent;

(8) tropical climate. Even at the time of early colonization, the question was raised as to whether, besides the many factors already mentioned, the climate also contributed to the failure of white settlement in the tropics.

The figures given in Table I show the decline in white population in Barbados and Jamaica

TABLE I. — *Population of Barbados and Jamaica in the last three centuries* (1).

| Year | Barbados | | Jamaica | |
|---|---|---|---|---|
| | White | Black or coloured | White | Black or coloured |
| 1640-1643 | 37,000 | 6,000 | -- | - |
| 1667-1678 | 20,000 | 40,000 | 8,500 | 9 500 |
| 1786-1791 | 16,167 | 62,950 | 23 000 | 260,093 |
| 1807-1809 | 15,566 | 69 110 | 15,000 | 336,070 |
| 1921-1922 | 15,000 | 180,000 | 14,476 | 817,643 |

(1) Figures taken from 'White settlers in the tropics' by GRENFELL PRICE (p 21)

The description of the West Indian planter in the XVIth and XVIIth centuries by the Jamaican historian BRYAN EDWARDS is very interesting. This accurate observer had already noted the changes produced in the physique due to tropical conditions, changes which were reported later by many medical men and scientists. It seems that there really are somatic characteristics acquired through the influence of climatic conditions and other again which characterize the creoles (whites born in the West Indies and descended from European ancestors). The following is an abridged version of the account given by the Jamaican historian:

'The Europeans born in Jamaica were a taller race, but, in general, were not proportionately robust They were distinguished by freedom and by suppleness of joints, which enabled them to move with ease and agility and gracefulness in dancing They also excelled in penmanship and in the use of the small sword Their eye sockets were deeper than among the natives of Europe which, according to the writer, guarded against the continuous glare of the sun. Their skin felt cooler than that of the European, which proved that nature had contrived some means of protecting them from the heat. Possibly the climate increased their sensibility, which contributed to create an impatience of subordination On the whole, this attitude was beneficial as awakening frankness, sociability, benevolence and generosity (It is to be doubted whether these traits are the consequence of tropical climate; in my opinion, it is rather the result of the seigniorial surroundings). Though the method of living differed in no respect from that of the European residents, they were rarely liable to those inflammatory disorders that frequently proved fatal to the latter. The women lived calm and even lives, marked by

habitual temperance and self-denial. They took no exercise except dancing and had no amusement or distraction. Their diet was abstemious to a fault; lemonade was their strongest beverage, their food at the principal repast was a vegetable mess, seasoned with Cayenne pepper Their mode of life and the hot oppressive atmosphere produced lax fibre and pale complexions They seemed to have just risen from a bed of sickness Their voices were soft and spiritless, and every step betrayed languor and lassitude Eminently and deservedly applauded for heart and disposition, no women on earth made better wives or better mothers.

The children's mental powers developed early, exceeding those of European children of the same age. Subsequent mental acquirement did not keep pace with early progress, possibly due to the want of proper objects for exercizing the faculties The climate undoubtedly encouraged early and habitual licentiousness, which was against mental improvement Among the native-born, however, were found men of capacities as strong and permanent as among any people whatever Frank, kindly and truthfull, they treated the slaves far better than did the adventurers from Europe Indolence was too predominant, but it was rather an aversion to serious thought and deep reflection than due to slothfulness and sluggishness of nature'

Grenfell Price, from whose work this passage has been taken, affirms that apart from certain characteristics due to isolation and the seigniorial life of the planter aristocracy of the island, this description is applicable in some respects to the present generation of North Queensland whites. The author of this study is of the same opinion as regards the whites of the second generation with whom he was acquainted during his stay at Java. Evidently, sport and the transport facilities of modern times have slightly modified conditions and, in consequence, the physique and morale of whites in tropical countries.

Following up this historical review, an attempt will be made to examine the present-day white settlements on which up-to-date information is available.

## Puerto Rico.

The Island of Puerto Rico is one of the most interesting examples of white settlement in a purely tropical country. It was in the XVIIIth and at the beginning of the XIXth century that Spain promoted emigration to this Island. The emigrants belonged to the poorer classes and had no capital to purchase negro slaves. Consequently, they were obliged to till their own land. Negro immigration was not so extensive as in other isles of the West Indies and consisted of freed blacks and slaves, the latter partly obtained from Haiti.

Inter-breeding took place to some extent, but the white element predominated from the beginning of the XIXth century and has continually increased as a result of further immigration and the extraordinarily high birth rate.

In 1845, the island contained 216,183 whites, 175,791 free coloured persons and 51,265 negro slaves. By the time of the Treaty of Paris, 1898, there were 570,187 whites, 239,808 mulattoes and 75,824 negroes. In 1925-26, the Department of Health estimated the population at 1,417,646, comprising 23 2 per cent. coloured. At this time, the density of population rose to 500 persons per square mile and 1,500 per square mile of cultivated land. The latest figure available for the total population stands at 1,723,500; recent data on the apportionment of the different races is wanting.

The blacks and mulattoes have established themselves along the coast where a considerable number are employed at the sugar mills. The mountainous interior region where the predominating crops are coffee and tobacco, is peopled by whites. It is here that the class of white farmers has developed, the 'jíbaros' (peasants) as they call themselves.

A Puerto Rican, José C. ROSARIO, gave the following account:

'The scattered houses due to the individual character of the Spaniard as well as the prohibition of trade with foreign countries, which was practically equivalent to no trade at all, developed the Puerto Rican peasant who, ignorant and superstitious and content with a very low standard of living, still possessed a natural kindness and chivalry inherited from his Middle Age peninsular ancestors When towns were established, the brightest colonists settled in them and began to look down on the country people (jíbaros). These town people soon monopolized all advantages and progress for themselves.

Despite his many good qualities, such as generosity, kindness and honesty, the jíbaro is an inefficient producer and has never had any but the lowest standard of living. He multiplies at a frightful rate If he cannot have two bananas for lunch, he will eat one or none, if money is not sufficient to buy two dresses for his little girl, one will do; if he cannot have a wooden house, he is willing to live in a grass house; if there are no seats, he will sit on the floor, but he will marry young and have as many children as God wills to send '.

Before discussing the social measures taken by the United States Government, the climatic conditions have to be studied. A central axis composed of chains of eroded mountains and hills is bordered along the coast by a narrow strip of low-lying land. This mountain axis lies athwart the path of the northeastern trade winds which blow almost constantly except during the late summer and early autumn months, when they bear a steady burden of moisture to its northern slopes. The average annual rainfall for the entire Island is 71 inches, but the amount varies greatly from year to year and in geographical distribution, ranging from 21 inches in the drier sections of the southern coast to 169 inches in the higher mountain regions. The mean annual temperature is 76° F, the average for the coldest winter month being 73° and for the warmest summer month 79°. These figures are slightly lower in the inland moutainous region, 69° F in January and 75° F in August, while on the coast, the temperature rises to 75° in January and 81° in August. Puerto Rico, therefore, enjoys a mild, even climate without excessive heat; the Caribbean hurricanes which from time to time devastate vast areas of the Island, however, are a serious handicap.

Sanitary improvements were the first measures tackled by the Americans on their occupation of the Island. The Department of Health of the Rockefeller Institute, the excellent School of Tropical Medicine as well as the municipal hospitals carried out a vigorous campaign against the main diseases. Many attempts were also made to improve the hygienic standards of the people. Immediately after American occupation, vaccination against small-pox was made compulsory; the control of yellow fever was very successful.

Despite the remarkable progress made, health conditions were not improved to any considerable extent. Intestinal disorders (diarrhoea and enteritis), tuberculosis, malaria and uncinariasis or hookworm are still very prevalent. In 1928, 21.8 per cent. of the deaths were due to intestinal disorders, children

being the chief victims. So high a percentage was accounted for by overcrowding: too many families established themselves along the water streams which, being the only source of drinking water, were the constant cause of infection. The water supply is well regulated in the cities, but the scattered housing system of the jíbaros makes water regulation difficult. The death rate due to tuberculosis is the highest in the world, the city dwellers being the chief victims.

Malaria and hookworm are both dangerous diseases in most tropical countries. It is reported that effective measures have been carried out against hookworm infection. Deaths due to this infection had fallen from 7,369 in 1899 to 483 in 1928, partly owing to regular examination of school children. It is evident that hookworm weakened the person affected both physically and morally.

The death rate is still high, 27.7 per thousand in 1928-29 (more recent figures and also figures referring to the white population alone are wanting). The death rate, however, is exceeded by the birth rate which for the same period stood at 39.1 per thousand. Disease control is handicapped by a shortage of doctors and midwives which gives free scope to charlatans. The same José C. ROSARIO mentioned above, states that to start a conversation with a jíbaro family about health is like opening a catalogue of diseases. From 346 families studied, including 2,165 people, there were 2,175 cases of disease. The prevalence of colds and hookworm was astounding.

Poor sanitation, inadequate housing and malnutrition are, to a great extent, responsible for these deplorable conditions. In most cases, the houses only have two or three rooms; while famillies as a rule are very large. The huts are divided into two apartments by a partition of palm fronds. The estate owners are endeavouring to improve housing conditions for their employees, but in the mountain districts housing is still very inadequate. The jíbaro has neither bed, table, chair, matting, carpet, wardrobe, mirror nor lavabo; his furniture consists of a hammock only; those who have no hammocks sleep on the ground.

Malnutrition is a problem even more serious than housing. Owing to food shortage, many people live on the margin of starvation. Most of the foodstuffs are imported. The chief food is polished rice, followed by beans and salt fish. This dietary, poor in vitamins, together with hookworm, retards infant growth. The suggestion was put forward to cultivate food crops, a suggestion, however, which was not approved by the reformers of Puerto Rican agriculture (GAYER, HOMAN and JAMES). The directors of the two important experiment stations of Mayaguez and of the Puerto Rican University, include in their programs for improvement the introduction of new industrial plants or other high-yielding plants which would provide a new source of export products, in particular those for which there is a demand in the United States. These experts are against the extension in the area of food crops. Puerto Rico imports, they say, because imported products are cheaper than home produce. Home produce also, could not possibly compete with the imported product in quality. It is recognized, therefore, that a small farm in the tropics cannot provide the sustenance necessary for the upkeep of the white settler and his family.

In all agrarian reform at Puerto Rico, as elsewhere, the system of land tenure must be taken into account. From the early period of Spanish occupation, the

fertile land of the coastal plain belonged to the large landowner, sugarcane being the chief crop. After American occupation these lands were bought up, for the most part, by limited liability companies. The exemption of customs-duty on Puerto Rican sugar granted by the United States Government contributed considerably to the prosperity of the Island. The sugar industry necessitating much seasonal labour, has, on the other land, increased the existing numbers of rural proletariat having no fixed residence (floating labourers) and looking for temporary employment wherever there is an opportunity and, in consequence, being out of work during the months without seasonal occupation. It is to be regretted, in this respect, that the periods of greatest activity as regards the chief crops—sugarcane, coffee, and tobacco—generally coincide, and that the months of August and September constitute a slack period.

Figures given in the first world agricultural census indicate the predominance of the class of agricultural labourers representing a true rural proletariat. The number of persons engaged in agriculture in 1930 totalled 261,769, 17 05 per cent were farmers (proprietors and tenants), 2 7 per cent farm managers and overseers, and 80 2 per cent farm labourers Farms of 1,000 acres and over represent 0.2 per cent of the total number of farms, but cover 25 2 per cent. of the surface area under cultivation, while the farms of 3 to 9 acres represent 46 1 per cent. and only cover 6 4 per cent of the total area under cultivation CLARK gives interesting figures on stock-owning, these figures were obtained from an enquiry held among a certain number of families of labourers working on the one hand in coffee and tobacco plantations and, on the other, in sugar estates; in the first case, it was found that the use of one horse was divided among 32 families and in the second case, the proportion was one horse for 134 families; one cow for 15 and 23 families respectively, one goat for 7 and 9 families, one pig for 3 and 4 families and lastly, one fowl for 4 and 2 families

There has been no want of attempts at improving this situation; the Government of the United States, supported by the Church and by philantropic institutions, has gone to considerable expense in this respect; serious difficulties have always been encountered and the right road to improvement has still to be found. The Island is over-populated; therefore, emigration is encouraged. Endeavours to find work for these emigrants on plantations at Cuba and other islands of the West Indies have failed, owing to competition from the negroes and mulattoes, competition which the whites find difficult to combat. A small-scale emigration directed towards the United States, limited to individuals knowing English and having a professional or scientific instruction has not contributed to any great extent to the improvement of the situation. In view of these failures, the present trend is towards intensification of agriculture, which signifies —as has already been mentioned—rather the introduction of new industrial crops and the increase in cultivation of the crops usually grown in the Island, in particular, coffee and tobacco, than increased acreage in food crops. The question of establishing industrial centres so as to absorb the surplus rural population is also raised.

The question as to whether a drastic change in the land tenure system would bring about an effective improvement in the life of the inhabitants has often been discussed. It is evident that the profits realized by the sugar-mills and going to absentee estate owners, form a sharp contrast with the extreme

poverty of the rural masses. On the other hand, supposing that the 600,000 acres which were under sugar in 1930 were split up among the population, the result would have been lots of about two acres per family of six persons, completely inadequate for the most primitive means of subsistence. It should also be remembered that owing to intensified methods of cultivation, the yields per hectare of large estates have reached a much higher level than that attained by small farms; this is a factor which shows the advantage of keeping up large estates.

The problem, however, has not been kept in the realm of theory; projects for the splitting up of large estates have been carried out. In consequence of the ' Sugar Plan ' of the P. R. R. A. (Puerto Rican Reconstruction Administration), in December, 1936, the French Lafayette Sugar Company which owned 10,400 acres comprising 8,000 acres under lease and a mill with a crushing capacity of 2,500 tons cane per day was purchased. Land was distributed to workers' associations and to early colonists whose land was bought up by the big companies. The results of this interesting experiment are not known. Generalization on the subject is dangerous as, compared with other sugar-cane growing areas, Puerto Rico has a relatively high number of small farms.

American writers who have studied the question of social reform in Puerto Rico always come to the same conclusion that a reform can only succeed if it is carried out on the initiative of the people themselves. Education has made considerable progress: during the Spanish occupation in 1898, there were 518 schools, while in 1930, there were 2,444 schools with 221,000 pupils of whom 7,000 were taking high school courses The Americans have also established a university and a higher school of agriculture. These efforts have not always given full satisfaction, particularly as regards primary schools. The number of children who cannot attend school is excessive; the young people on leaving school do not obtain full benefit from the knowledge acquired; there are no funds for the purchase of books and consequently, no means of continuing and improving education. In every instance, it is not the spirit which is wanting; progress always stumbles against the usual cause, the extreme poverty of the people. Advanced education, on the other hand, has given very satisfactory results: all the government departments saw an increase in the number of good technicians trained at the local high schools, many of whom have found employment outside their country, in the United States, in Cuba and elsewhere.

The case of Puerto Rico has been treated here in detail as an early example of white settlement, the history of which is known. The sources from which information was taken are indicated in the list of publications consulted.

In summing up, it is seen in Puerto Rico, that the number of white farmers, in most cases still of pure blood, has multiplied considerably during several generations in a purely tropical region. These settlers have not prospered. On the contrary, they have suffered extreme poverty, which has naturally had

its effect on their physical and moral condition. They are subject to many diseases but, although the death rate is very high, it is always lower than the birth rate and consequently, owing to the restricted resources of the Island, they are faced with the serious problem of over-population, a problem for which no satisfactory solution has as yet been found.

### Other islands of the West Indies.

None of the other colonies of whites in the West Indies has acquired the importance of the settlement at Puerto Rico; they are small settlements only of interest in the fact that European settlers have managed to live for many generations under tropical conditions. GRENFELL PRICE has visited most of these settlements and his book also contains useful information on those which he was unable to study personally.

### St Martin.

The white colony here is half French, half Dutch. The majority of the whites are fishermen. The houses are well built. In 1933, there were many cases of hookworm. A health campaign and the compulsory wearing of shoes, imposed by the Dutch Government, improved conditions.

### Saba.

Small volcanic island, Dutch colony Early white settlements date back to the XVIIth century. At that time, the island was occupied temporarily by the English, Saba still remains English-speaking to-day, although the inhabitants are mostly of pure Dutch descent. There are five villages with a total population of about 1,450, half being whites. The standard of living of these whites in general is fairly high and the few cases of degenerate families are due to the relative frequency of intermarriage. Clothing is neat and the attractive cottages are clean and well kept. Schools are good and regularly attended by the children. In the past, farming was the chief occupation of the people; as there were very few negro slaves, the white settlers had to do all the work themselves. With draught animals wanting, all loads are handled by human labour; as a result of this strenuous manual work, the men look strong and healthy.

To-day, the majority of the men earn their living at sea, consequently there are more women than men on the island. Malaria and hookworm are unknown. The diet is not well balanced as Saba is no longer self-supporting in the matter of food since slavery was abolished Farming receives little attention as the men prefer to earn their living at sea which offers better possibilities. The women spend most of their time indoors; they do drawn-thread work which has proved a profitable source of income, but the sedentary life seems to have a harmful effect on their health as compared with the men, they often have a sickly aspect and do not stand the climate so well. GRENFELL PRICE doubts if this small

white colony can continue to exist, as the competition of the blacks whose birth rate is about twice as high as that of the whites, is too strong. The blacks also show a greater resistance to disease and in periods of depression adapt themselves more easily to a lower standard of life.

**Jamaica.**

There is a German farming community at Jamaica which dates back to 1834-35, having been established after the abolition of negro slavery. It is a small settlement of hard-working farmers who have entirely forgotten the German language. There has been very little interbreeding with the negroes. The people do not seem to have any definite idea of time. The children learn more easily than the coloured ones, but frequently have a very bad temper. Medical facilities are inadequate, typhoid and hookworm are severe though malaria is not a menace owing to the elevation of the settlements. The standard of life of the settlers has remained high despite their isolation and their constant contacts with their negro neighbours.

**St Thomas, American Virgin Islands.**

St Thomas contains two French settlements little is known of their origin. Possibly their ancestors came from the French island of St Bartholomew which was colonized by settlers from Normandy at the end of the XVIIth century, so that it may be said that in this case it is a question of a sequence of generations having lived for over a century and a half in the tropics. The settlers are devout Catholics with a great love for France. They are almost all pure white. The inhabitants of the northern part of the island, which has a higher rainfall than the southern area and is also more exposed to the trade-winds, are engaged in farming and produce many of the bananas, pineapples and vegetables sold in the local market. The southern group consists of village fishermen. The former are taller and heavier than the latter. Both groups appear to suffer from hookworm, owing to careless sanitary habits and to going barefoot. In both, inbreeding has led to degeneration. Both prefer to hoard their money rather than improve their miserable cabins in order to avoid taxation. The healthier condition of the Northsiders is attributed to a more balanced diet than that of the fishermen of the southern group, being composed of fresh vegetables, freshly caught fish and some preserves. The villagers are zealous and industrious and their moral standards are very high.

**Grand Cayman Island, the Bay Islands (Honduras), Old Providence Island (Colombia).**

The study of the inhabitants of these islands, descendants of shipwrecked sailors and probably of buccaneers, is of little interest as they disregard farming and engage exclusively in seafaring occupations.

**Barbados.**

There is very little information available on the poor whites called 'red legs' of Barbados, descendants of plantation labourers in the West Indies in the XVIIth and XVIIIth centuries whose unfortunate fate has already been described earlier on in this article. The International Health Board of the Rockefeller Foundation in 1918 published a report by G. P. PAUL on the prevalence of hookworm in the white colony; this report showed that sanitary conditions were terrible and that an enormous percentage of the poor white population was riddled with hookworm. Colonial reports published in recent years as well as the important work lately written by OTIS P. STARKEY make no reference whatsoever to the problem of the poor whites.

**Costa Rica.**

The Republic of Costa Rica is one of the few examples of a white settlement which in many respects has proved successful. Full information, however, especially as regards economic conditions, is not available. Besides the work of GRENFELL PRICE, we have also consulted an article of WAIBEL which contains considerable information on the density of the population and also on the unpopulated zones suitable for white settlement.

Like other republics of Central America, in natural features Costa Rica falls into three divisions known as 'tierra caliente', 'tierra templada' and 'tierra fria'. Investigators differ as regards the exact demarcation of these zones SAPPER established the following division: 'tierra caliente', 0-600 metres; 'tierra templada', 600-1,800 m.; 'tierra fria', above 1,800 m. The Atlantic and Pacific slopes and the coastal plains both lying within the 'tierra caliente' zone, show great variation in climatic conditions. The Atlantic zone is characterized by a high average temperature, heavy rainfall and great humidity throughout the entire year. These conditions make life difficult for whites The Pacific slope is very steep, the climate, similarly to that of the coastal plains, is drier than in the Atlantic zone and, consequently, is more suitable for whites. It is the plateau zone, however, which is of the greatest interest, being the only zone suitable for white settlement zone. The capital, San José, situated on an elevation of 3,700 feet, has a mean annual temperature of 67.5° F; the average for May, the hottest month, is 70° F, that of the coolest month 66° F; the absolute maximum is 86° F; the absolute minimum 55° F. The annual rainfall is some 76 inches; there is a very pronounced dry season from December to April.

The smallness of the Indian population has, since the discovery of the country, stimulated white immigration. An estimate of the year 1522 gives the Indian population at 27,000, and these the whites rapidly absorbed or deported to Peru and Panama; today there are only some 4,000 Indians. Consequently, on the one hand, there was a shortage of native labour and, on the other, no capital to purchase negro slaves, with the result that colonists were forced to work their farms themselves.

In view of these circumstances, the large estates of the conquest period could not survive and were subsequently split up among the children of the owners, with the result that the plateaux are populated by white peasant farmers. The relatively cool and healthy climate, a well distributed rainfall and fertile volcanic soil all favoured permanent white settlement. Another factor was the almost complete isolation of early times when the only means of access was the route which leads from Puntarenas on the Pacific slope to the plateau. This obstacle prevented Indian and negro immigration. This benefit was, it is true, offset by certain disadvantages as it retarded the progress of the population.

Lastly, another favourable factor was the character of the Spanish conquistadors. These were Castilians, Andalusians, Catalonians and Galicians of good type who had brought in Spanish women as early as the XVIth century; miscegenation with the Indians was accordingly rare.

Christopher Columbus discovered the Atlantic coast line of Costa Rica in 1502, but the first attempts at colonization only date from 1540 when Hernan Sanchez de Badajoz founded the parish of Badajoz. It is due to the priests who carefully recorded all newly established parishes that there is so much information available on the movements of the population since the beginning of colonization. A new parish was founded when the population of a district rose to over two or three thousand. Throughout the colonial period, increase in population was slow. in 1572. the country counted 53 Spanish families; in 1676, there were 600 Spaniards, mestizos and mulattoes in the Cartago District and 100 in the Esparta District. In 1719, the Governor reported that Costa Rica was the most miserable Spanish colony in all America. It was only during the XVIIIth century that any development began. In 1751, the San José counted 399 Spanish families and 2,330 inhabitants. The census of 1809, period when the Indians of the plateau had been almost completely absorbed, estimated the total population of the country at 50,000 to 60,000.

A considerable rise in population began in 1821, following the declaration of the independence of Costa Rica. The subsequent general material and spiritual improvement was undoubtedly the cause of this increase as shown by the following figures: 79,982 inhabitants in 1844, 120,499 in 1864, 182,073 in 1883, 243,205 in 1892, 441,342 in 1916 and 591,862 in 1936.

Table II. — *Population of Costa Rica.*

| | 1812 | 1916 | 1936 |
|---|---|---|---|
| *Region:* | | | |
| **Atlantic Plain** | 7,484 | 23,632 | 35,290 |
| **Highlands** | 203,505 | 353,987 | 452,211 |
| **Pacific Plain** | 32,216 | 63,723 | 104,361 |
| Total | 243,205 | 441,342 | 591,860 |

Up to the beginning of the present century, this increase was due almost entirely to the progress made by the white population of the plateau. A slight change took place following the development of the Atlantic coastal area, a zone formerly neglected and which was cleared by the large banana companies, using mostly negro labour. (See Tables II and III).

TABLE III — *Percentages of the different races in the three regions.*

1927 figures

| Region | Negroes | Whites | Mestizos | Indians | Mulattoes | Mongols | Others |
|---|---|---|---|---|---|---|---|
| Atlantic Plain | 55.7 | 34.4 | 3.3 | 3.3 | 1.3 | 0.7 | 1.3 |
| Highlands | 0.2 | 91.0 | 8.0 | 0.5 | 0.2 | 0.1 | 0.0 |
| Pacific Plain | 0.5 | 50.1 | 45.9 | 1.6 | 1.3 | 0.5 | 0.1 |

*N. B.* — The figures of both tables have been taken from White Settlers in the Tropics by A. GRENFELL PRICE.

The construction of railways on the plateaux and others connecting with Port Limón on the Atlantic coast and another from Puntarenas on the Pacific coast contributed considerably to the progress of the country and to an increase in the white population.

All visitors to Costa Rica agree as to the high intellectual standard of the people. This little republic is particularly proud of the advance made in education. The percentage of illiterates of the total population is 23.6, a relatively low figure.

As regards housing, the traveller advancing from the Atlantic coastal area towards the interior sees a great improvement on comparing the unsanitary huts of the negroes which are without flooring and shared with their domestic animals with the simple but clean houses of the settlers of the plateaux. The standard is lower in the poorer suburban districts than in the country.

The different campaigns carried out by the Rockefeller Foundation have given admirable results. Yellow fever has practically disappeared. The battle against hookworm and malaria continues. The latter is particularly prevalent in the coastal zones and is one of the chief obstacles to the expansion of white settlement in that part. Hookworm can never be eradicated until the living conditions of the poor white peasants are improved. Here as elsewhere there is always the same vicious circle; too poor to buy shoes, these peasants are continually subject to hookworm infection, which debilitates them and destroys their energy, thus keeping their standards of living low.

The birth rate is exceedingly high; 46.2 per thousand for the period 1926-30, while the death rate for 1927-31 was 22.7 per thousand. The increase in total population and, in particular, the white population, was very pronounced. It

could be said that Costa Rica is over-populated, especially as regards the central zone which counts 376 inhabitants per square kilometre including the town population and 180 excluding the towns.

In the publications consulted, no information was found on white peasant farming. It would, however, be interesting to know the importance in the total revenue of food crops as compared with that of industrial or export crops. The only data available, taken from the British Encyclopedia of 1938, are based on trade figures Value of imports in 1936 £ 1,877,600; chiefly food products and manufactured goods, value of exports for the same year. £ 1,765,000. Coffee totalled 56 8 per cent. and bananas 35.5 per cent Cacao is also produced and there are a few gold mines. Banana cultivation, which has dropped in production owing to soil exhaustion, is almost entirely under the control of large fruit companies which employ negro labour The white inhabitants, therefore, are mainly dependent for a living on the coffee and cacao crops. As has just been shown, food imports are very high It is a question, therefore, whether the country can become self-supporting in the matter of foodstuffs. This is an open question for Costa Rica, question which will again be referred to in the general discussion on the economic conditions of whites in tropical settlements.

As regards the danger of negro immigration, opinion in the Republic is divided. Some of the leading statesmen do not consider that there is any danger of the negroes invading the plateaux, as many of them have no wish to leave the Atlantic coastal area, while others are emigrating owing to soil exhaustion caused through the banana industry. On the other hand, others blamed the fruit companies for introducing the soil exhausting crop—the banana, for monopolizing transport and commerce and especially for having brought in the negro who constitutes not only a danger to racial unity but also a source of many pernicious diseases. The Government, in view of these opinions, now prohibits the entry of all coloured races and refuses the return entry of coloured people who leave the country.

## South America.

Attention has already been called to the difficulties involved in the study of white colonization in the tropical countries of Latin America (see p. 208). The existence of white settlements which have remained pure for several generations, is not improbable, but it is very difficult, in view of present circumstances, to procure accurate data. In regard to the republics of the tropical Andes Venezuela, Colombia, Ecuador, Peru and Bolivia, LUGARI sums up the present state of conditions as follows:

'The day-labourers of a more or less pure white race are not many The whites are to be found chiefly in the peasant-proprietor, metayer or farmer class and mostly in the regions where the temperature varies between 60°8 and 73°4 F.; in the hot zone, very few whites are to be found working as day-labourers on the farms. There are also very few who have become farmers, carrying out themselves the heaviest of manual work '

As regards Brazil, it is even more difficult to find accurate information. Undoubtedly, however, the mass of the agricultural population in São Paulo State consist of whites, for the most part of Mediterranean origin: Italians, Spaniards and Portuguese. It is the Latin worker who, to a great extent, has replaced the black slave in the coffee estates, part of which have now been turned into cotton and citrus plantations. It should not be forgotten, however, that the climate of the State of São Paulo cannot be considered as tropical, although the State is crossed by the tropic of Capricorn. The climate is defined by KOEPPEN as C w (C: temperature of the coolest month varying between a maximum of 64°4 F. and a minimum of 26°6 F.; w: dry season during the winter of the Southern Hemisphere). The mean temperature of São Paulo is 64°82 F.; that of the hottest month 71° F., that of the coolest month 57°64 F.; the mean annual rainfall is 52 inches of which 15.3 inches fall in January and only 0.4 inches in July. The climate, therefore, is temperate and not tropical. This is not the place to discuss the problem, interesting in many respects, of white infiltration into São Paulo and the other southern states of Brazil.

Mention should be made, however, of two cases of white settlement without any Indian or negro mixture found in the tropical regions of South America: — The Dutch peasant colony at Surinam and the numerous settlements of German peasants in the Brazilian State of Espirito Santo.

## Surinam.

An example often cited is that of the Dutch peasants who emigrated in 1845 to Surinam, where, despite unhygienic conditions and many diseases, they have remained for almost a century. The author much regrets that he was unable to procure the remarkable work of Mevrouw VERKADE-VAN DISSEL which is based on careful personal observations. The following information, therefore, is not original (see COOL, P., FERNANDES, D. S., VAN HINTE, J., LAMPE, P. H. J., WINCKEL, Ch. W. F.).

The colonists first settled in the neighbourhood of Sarimacca but later established themselves near Paramaribo, capital of Surinam. They were not expert farmers, the emigrants not having been selected with sufficient care. Farming land was chosen in a haphazard manner. The infectious diseases—malaria, hookworm and typhoid fever—caused numerous victims. In general, economic conditions were very unfavourable; economic competition with the immigrant Hindus, a people very temperate in their habits and superior to the Dutch peasant in trading skill, was always severe.

Despite all difficulties, this small colony has continued to exist; there has been little interbreeding with other races. The birth rate still remains high; the average is said to be six children per family. Notwithstanding the climatic conditions of the coastal plain, more difficult to support than the climate of any other regions treated in this study, the colonists carry out the heaviest of manual work in their farms. No symptoms of degeneration can be observed; the infant death rate is low.

To have neglected and to continue to neglect the elementary requirements of hygiene, these are the worst faults of the colonists. Verminous diseases spread owing to defective drainage and inadequate privies on the one hand, and to want of shoes on the other; the children hardly ever wear them, while the adults only use them on holidays. Mosquito-nets are never used and all other measures for controlling the mosquito, transmitter of malaria, are neglected. In this case as in that of the German settlers in Brazil, it may be said that there is a moral degeneration which is manifested by a want of energy in adopting the well known and easy measures of controlling the prevalent diseases.

Consanguinity was another evil, but this was due to the isolated life and not to the tropical climate. It was found that in the second generation, 25 per cent. of the marriages were between relatives, this figure rose to 75 per cent. in the third generation.

D. S. FERNANDES considers the economic side of the question. The small farmer produces for himself, for the local market and for export. Not being used to a diet based on the food products indigenous to the country, he will practically always be obliged to import a large part of his foodstuffs. This places him in a position of economic disadvantage relatively to the coloured peoples, negroes, Javanese, Hindus who are also used to home products. The white settler, therefore, must endeavour to remedy this disadvantage by producing commodities which can be marketed in the country itself or exported. As regards local marketing, it has become very difficult, owing to the drop in prices brought about by the 1930 crisis, to compete with the Javanese and Hindu small producers. The products suitable for export, coffee, cacao and citrus, however, necessitate a large area of land and the investment of capital, neither of which is possible for the small farmer.

FERNANDES, in view of past experience therefore, advises against the establishment of further white settlements. On the other hand, he considers that there is a chance for the small capitalist who wishes to settle in Surinam and who could make a living, chiefly by establishing citrus plantations, always, however, with the assistance of coloured labour.

### Espirito Santo.

The work of E. WAGEMANN of 1915 is considered to be one of the most interesting reports on the subject. The environmental conditions, the history of colonization and the life of the colonists have been studied in great detail. Twenty years later the settlers were again visited by two Germans, G. GIEMSA and E. G. NAUCK. Their study completes that of WAGEMANN and shows the changes, very small in reality, which this settlement has undergone in twenty years.

Espirito Santo is one of the smallest states of Brazil. It forms a strip 400 km. long and 100 km. wide along the Atlantic coast. The country is very undulating and is about the size of Denmark.

The first German settlements date from the middle of the XIXth century. The first colony was that of Sta. Izabel on Rio Jucú, established in 1847, the settlers coming from Rhineland (Hunsrueck, Hesse). In 1860, there were 628 in all, of which 410 were Germans. Another settlement, Sta. Leopoldina, was founded in 1857. This settlement was not purely German, as in 1860 it counted 232 families comprising 1033 individuals, of which only 593 were Germans. The remaining 440 were of different nationalities — 120 Dutch, 104 Swiss, 82 Tyrolese, 70 Luxemburgers. Two thirds of the people were Protestants, one-third were Catholics. This fact is of interest as subsequently the Catholics proved to be much more capable in adapting themselves to the new surroundings and particularly in learning the language of the country. The Protestants formed religious communities, isolating themselves almost completely. The pastors not only governed religious matters but also exercized administrative functions regarding many civil matters. It is the church that ensured the preservation of the German language, that provided the educational facilities and that even today represents the true intellectual centre of the colonies.

After 1870 a fresh wave of immigrants swept the State of Espirito Santo, composed this time chiefly of small farmers and labourers from Pomerania. In the course of years the early settlements expanded, partly owing to soil exhaustion and partly to the rapid increase in population. After 1873 German immigration stopped. Later the majority of the immigrants were Italians and Poles; it is to be regretted that no information is available on the settlements formed by these people.

In many respects the early period of settlement was difficult. The Swiss diplomat VON TSCHUDI, who visited Brazil in 1860, draws a sad picture of the settlements as they were at that time. It is true that the Government of the State encouraged colonization, that it endeavoured to assist the settlers by means of subsidies in the form of food and money and protected them from invasions by Indian savages. However, poor organization and depredations together with the want of pratical knowledge on the part of the early settlers and the wrong choice of land made the success of the colony appear doubtful. Later, a considerable improvement took place, an improvement which is attributed to the initiative of certain members of the Government as well as to the good physical and moral qualities of the Pomeranian settlers who to-day constitute the main element of the settlements.

This is not the place to go into detail on all the vicissitudes of the settlements nor to enter into a discussion regarding the exact number of Germans living in Espirito Santo State. As accurate data are wanting, approximations will have to suffice. GILMSA and NAUCK estimated the number of German colonists in 1936 at 30 000 out of a total population of 300 000; they therefore represent about 10 per cent. of the total population.

There are very few towns or villages. In general the colonists live on their farms placed amidst their lands which are called *colonias*. The distance between one farm and another is from fifteen to thirty minutes' walk. The church is the spiritual centre, the *vende* (shop) the trade centre and the general meeting place.

There are two zones of German colonization, one in the South, very hilly, where the oldest settlements are placed, situated at an altitude varying between 1312 and 2625 feet, and the other in the North, a later settlement situated at a lower level (328 1312 feet) The climate of the mountain settlements differs considerably from that of the low-lying colonies. Sta. Leopoldina situated at a level of 1705 feet has a mean annual temperature of 70°7 F The mean for the coolest month, July, is 65°3 F, that for the hottest month, November, 74°3 F. It has been found unfortunately, observations only cover a period of two years that the absolute minimum stands at 47°3 F and the absolute maximum at 92°3 F. The average rainfall is 74.8 inches, the rains last from 150 to 180 days. The dry season falls in winter (July-August). The low-lying zone has a less favourable climate the mean annual temperature for Nucleo Affonso Penna is given at 78°26 F, the average for the coolest month, July, being 72°5 F. and for the hottest month, December, 86°18 F, with a maximum absolute of 104°9 F. and a minimum absolute of 46°4 F Rainfall is insufficient. For 1911, 19.3 inches were reported, the winter season is very dry, sometimes there being no rains for over three months These long periods of drought may have serious consequences, especially for stock farmers.

Apart from these droughts which are confined to the low-lying regions, climatic conditions are very favourable for whites, being much better than those prevalent in most tropical countries The soil also is very fertile, the land permitting the cultivation of both coffee and of food plants (maize, cassava, etc.), as well as being eminently suitable for stock-raising On the other hand, however, communications are difficult owing to the mountainous nature of the country and to the absence of navigable rivers and railways. The few carriage roads are badly kept and in most cases are not well adapted for motor truck and omnibus traffic.

In general, a farm comprises two to three 'colonias' from 50 to 75 hectares; a 'colonia' is 25 hectares Taking into account the general conditions of Brazil, it is the small farm which predominates. There are very few larger farms as they could not be managed by the members of the family alone. There has never been any inclination to employ hired labour; the concept of the farm as being the property of the family to be cultivated only by the members of the family is deeply rooted in this people which in the past emigrated to escape from working under servile conditions. Heavy and pressing labour such as the construction of houses and other buildings was carried out by the voluntary and free assistance of the neighbours.

Economically, farming depends, on the first instance, on coffee. The income obtained from this crop is used to cover all the small necessities of life: clothing, lighting, implements, arms, ammunition, cigarettes, etc. The settlers live almost entirely on their own farm products. Maize, cassava, legumes, bananas and other crops are grown, and small quantities of wheat flour and rice are purchased. Each farmer has from ten to twelve head of cattle, a large number of pigs and a well-stocked farm-yard. The farm produce is not sold. The entire economic structure, therefore, could not be simpler.

The houses and clothing are neat and clean. Traces of the old peasant costumes brought from the homeland are still to be seen. Shoes are only worn on Sunday; during the week everyone goes barefoot despite the danger of hookworm which is very widespread.

The houses built in common, have a pleasing aspect. The furniture, home-made, is very plain. The want of privies is a serious drawback and contributes greatly to the dispersion of hookworm. The technical progress of today electric light, wireless, etc. are only very slowly becoming known to the settlers of Espirito Santo.

The people like a good table. Maize flour is used in making bread, the well-to-do families also using wheat flour, a product imported at a high price. Haricot beans, sweet potatoes and cassava are always served at meals. There is a large consumption of poultry, meat, pork eggs, cheese and also fish found in the many water courses of the mountain region. The supply of drinkable water is insufficient, the water is often polluted and is the source of many diseases. Propaganda measures with a view to improving the water supply, either by a better system of collecting and conveying the water or by proper filtration, have not met with much success with the colonists, who remain, in this respect as in many others, hostile to any change.

Farm work is very heavy and takes the entire day, each member of the family taking part. All clearing of the brush is carried out by the men This proves that the current opinion as regards the inability of whites to carry out heavy manual labour in the tropics is erroneous Every assistance in the farm work was welcome, consequently, the general desire was to have as many children as possible.

If coffee cultivation constitutes the basic element of the economy of the farms, it absorbs more working time than the other crops. WAGEMANN gave as average yield per farm, 100 to 150 arrobas of coffee (berries), that is, 1500 to 2250 kg This is the crop that can be harvested by family labour according to its size. The area under coffee varies from one and a half to two hectares per farm, four to six hectares are sown to maize, one hectare for root crops, four hectares for pasturage, 10 to 12 hectares are cleared but are not cultivated or else are only occasionally sown to maize and root crops. The rest of the farm is brushland. The farmers of the lowland put more land to pasture than those of the upland zones.

Without going into further detail on the cultivation of food crops and on stock-farming, which are of no particular interest, some information of importance will be given on the chief crop, the real mainstay of the settlements, coffee. The methods of cultivation follow no definite system and the trees are not properly looked after. There are no coffee nurseries; in laying out new plantations, odd plants found in the orchard or those grown from seed fallen before harvest were used. The berries are usually harvested stripping them off the branches by hand: a crude method, which, however, is generally used in Brazil. The intercalary cultivation of food crops is a general pratice; these plants exhaust the soil and their roots compete with those of the coffee trees for nutrients.

GIEMSA and NAUCK confirm, twenty years after WAGEMANN, the opinion expressed by him as to the exhaustion of soil produced by the cultivation of coffee, pointing to the danger of erosion. No progress has been made in cultivation technique despite the establishment of a model estate where an attempt has been made to introduce the terrace system of cultivation. The effects of a lack of anti-erosion measures were already felt at the time of WAGEMANN. The latter estimated that with the cultivation methods practised, 15 to 40 years would suffice to exhaust the soil to such an extent as to compel the colonist to abandon his farm and seek land in the brush and set up anew. It is a question, therefore, of shifting cultivation which, however, differs from the shifting cultivation of primitive people in that the settler never returns on the land he has left and which he has completely ruined, while the 'savage' takes care not to ruin forever the land he has temporarily occupied. This difference is made even more evident by the photographs reproduced in the publications of GIEMSA and NAUCK than by the explanations given in the text. Here, as in many other settlements of European emigrants, the same fatal error is committed: the reserves of virgin land appear immense and seem to justify rough and ready methods of cultivation. The German settler, however, who sees nothing beyond his own commune, is in no way concerned with the common interests of the State. He has remained a stranger in a country, the language of which in many cases he has not learnt and consequently he is unaware of the rapid extent of deforestation, he is unaware that frequently, for new settlers, land now has to be found to the north of Rio Doce. In this instance, there are good reasons for asking, from a general viewpoint whether colonization by large capitalistic estate companies would not be preferable for the common welfare of the State.

Mention has already been made of the rapid increase in the German population of the settlements. Some details on this point before dealing with hygienic problems will be of use. The investigators cited have carefully assembled birth and death rate figures taking into account a serious and peculiar difficulty: the number of births and deaths is known but the number of inhabitants is unknown or only known approximately, because only the members of the religious communities are counted in a census. Taking into consideration this difficulty and making the necessary allowances, it is possible to calculate approximately the birth rate. The birth rate is very high: 46 per thousand, while the death rate is low: 8.7 per thousand. On the basis of these figures, one cannot but arrive at the following conclusion: whites, represented in this case by individuals belonging to a Nordic race, are capable of living and having children in a climate which cannot be called other than tropical.

It would be erroneous, however, to suppose that an increase in population implies good health. The settlers' ideas of hygiene are very primitive. At first, there were no doctors; to-day, there are not many, and too often their place is taken by charlatans. Yellow fever and malaria, fortunately, are rare; the mountain district, practically is free from these diseases. It is hookworm, with all its consequences, which constitutes the chief danger: in the plains, 90.4 per cent. of the children are infected; 88.7 per cent. in the mountain area. Deaths through hookworm are exceptional, but there are cases of pernicious anaemia

and heart disease, as well as a general apathy and lack of energy. The other diseases are of lesser importance than hookworm and other parasitical infections. It is astonishing that the necessity of such simple prophylactic measures as the use of privies and shoes does not appear to be realized by the majority of a people where elementary education is general.

The new environment has not created a new type. The adults are not in any way different from the peasants of their country of origin. Up to the age of six, the children in Espirito Santo show a more rapid growth than those in Pomerania. At a later age, the children born in Germany are taller than the children of the Brazilian settlers, it is probable that this slowing-down in growth is due not to the climate, but to intestinal infection. No symptoms of degeneration have been observed, no trace of hereditary diseases has been found.

It is a moot point as to whether the want of spiritual culture of the settlers observed by travellers from Germany should be attributed to the tropical climate. In the opinion of the author, any tendency to come to a premature conclusion on this intricate question should be guarded against It would be unjust, in fact, not to admire the tenacity with which the settlers have kept to their language, customs and sound morals It does not matter if the results of the scholastic examinations are not as good as those obtained in similar schools in Germany. A sound knowledge of farming and willingness to work in the common interest can develop spontaneously in a settlement, even if the level of scholastic instruction is not high. It is to be regretted, however, that these qualities are wanting in the settlers of Espirito Santo. The chief crop, coffee, has been described as badly cultivated and soil-exhausting. The settlers have not made the least progress after fifty years of this crop. The carelessness in hygiene matters is another sign of retarded intelligence. Another point which may be mentioned is the lack of roads and other means of communications, it would seem that the German settlers who represent 10 per cent of the population of the State of Espirito Santo, should have been able to make their influence felt for the improvement of conditions in this respect.

Should this spiritual and civic laxness be attributed to the influence of the tropical climate ? The origin of the immigrants, come from a very poor environment, whose people had been oppressed for centuries, might quite well explain this mentality.. In this respect, mention may be made of the many observations relative to the influence of the social origin of settlers on the success of agricultural enterprises, which have been collected for some time in the United States

## Africa.

During the last thirty years, the settlement of the uplands of tropical Africa by a white rural population has been frequently advocated. Mention may be made of the efforts made by the English in Southern and Northern Rhodesia, Nyasaland and Kenya, by the Germans in their former colony of Tanganyika, the more recent efforts of the Belgians in Ruanda Urundi, and of the Italians in Eritrea and, after its conquest, in Abyssinia. The lowlands of Africa, according to unanimous expert opinion, are quite unsuited for white settlement.

Two facts should be considered: (1) None of the white 'colonies', with the exception of the recent Italian settlements in Abyssinia, actually constitutes a peasant settlement in the true sense of the word as given in the introduction. Here the white always directs work in the plantations, all manual labour being carried out by the negroes. (2) The climate of the uplands is not tropical according to the definition given at the beginning of this study.

Subject to these two reservations, it may be of interest briefly to review the attempts at white colonization in the African highlands, as these efforts raise questions coming within the scope of this article. As regards the first point, it is interesting to note that the early trend, especially in the case of Kenya, was to grant land not only to capitalists but also to individuals not having sufficient means to exploit large areas. Thus the Ex-Soldiers Settlement Scheme of 1919 provided for the distribution to ex-officers of 257 lots of 160 acres each. Apart from a rent of 1·10 rupee per acre per year, the grantee paid nothing to the Government. Subsequently, similar initiatives attracted to Kenya a certain number not of true peasants but of small farmers. If this conception does not entirely correspond to that of a true colonization, in the beginning, it was thought possible to settle a large number of people belonging to the small capitalist class with a view to establishing a permanent settlement (see M. SALVADORI).

The results as seen to day certainly do not justify the hopes of the early initiators. Farming as carried out by the whites in Rhodesia and Kenya represented by large estates, and the number of Europeans engaged in this activity is in reality very limited as is shown by the following figures taken from recent Colonial Reports

White population in Southern Rhodesia in 1937 55,408, of which only 3,680 were engaged in farming; white population in Northern Rhodesia in 1936 10,588, the majority of whom were employed in the mines Nyasaland in 1932 counted 1,894 whites, Kenya on December 31, 1938, 20,894, 15 per cent of whom were engaged in farming

This position both applies, *mutatis mutandis*, to Belgian Ruanda Urundi.

Before attempting to ascertain the causes that account for the limited number of Europeans following agricultural pursuits in Africa, it is necessary to give a brief outline of the chief climatic characteristics of the uplands.

In the nomenclature of KÖPPEN, the climate is designated as *Cwgi* (C: temperate climate, temperature of the coolest month ranging from 64°4 to 26°6 F., *w*: dry winter season; *g*: temperature characterized by a maximum before the solstice and before the summer rainy season; *i*: isothermal climate, the difference between the averages for the coolest and hottest months remaining under 41° F.). Kikuyu in Kenya situated at an altitude of 6724 feet may be taken as an example: annual mean temperture: 60°8 F., average for the hottest month, February: 64°4 F., average for the coolest month, August: 56°3 F. The average annual rainfall amounts to 45 inches of which 9:5 inches in the wettest month, April, and only 0.07 inches in the driest month, August. The climate of the Abyssinian uplands resembles that of Kenya; details will be given further on.

It is of interest to study more closely the influence of this climate which appeared ideal to the early pioneers, on the European and particularly on those who have taken up permanent residence, as well as on their descendants. M. SALVADORI has assembled some observations on this point; they prove that the problem of acclimatization is not so simple as was imagined by the early promoters of white settlement. The effect of the tropics on the human body in this case are combined with that of altitude. Those who make a prolonged stay in the highlands of Kenya generally pass through three phases: one, very brief, of acclimatization: a second, lasting, according to the constitution of the individual, from six to eight months during which the settler feels full of energy and activity; and finally a third, the longest and which lasts until leaving the country, characterized by physical and mental depression which may lead to complete decadence. M. SALVADORI attributes this phenomenon to the combined action of the variations in temperature between night and day and the intensity of solar radiations. In consequence of these factors, the children develop more rapidly than in Europe. Their physical and mental development, however, slows down fairly early and, when full grown, they appear physically and mentally inferior to the Europeans of temperate countries.

Interesting as these observations are, they do not fully explain the poor results obtained in the attempts at white settlement in the upland regions under British dominion. Two other causes are more conclusive:

(1) The presence of the native who today maintains his right to the land, a right which practically always clashes with the interests of the European landowner. Even in Kenya, where considerable areas are reserved for European plantations, the 'dual policy' has now been adopted, according to which the British Government regards the interests of the native as superior to those of the European settlers. The latter will only be assisted so long as their interests do not clash with the rights of the native.

(2) Poverty of the soil. Although no exact data are available, it does not seem very probable that the soils of the uplands, frequently badly eroded, are sufficiently fertile to maintain a European family, always provided that the family works the farm without the assistance of native manual labour.

Most investigators agree on this point. The African highlands are not suitable for white settlement in the true sense. The task of the white, task of importance, would be to manage the large estates or to instruct the native in improved methods of farming which, however, are adapted to his intelligence and his limited money resources. This, to cite but one example, was the opinion expressed by a German expert, C. TROLL, after having visited a large part of eastern Africa.

A contrary opinion was shared by the promoters of Italian colonization. The plan for the colonization of Ethiopia, in fact, regards as essential the introduction, besides the promotion of native agriculture and capitalistic colonization, of white settlers (See MORENO, QUARANTA and the work *La costruzione dell'Impero*). Fascist Italy proposes to use new methods in settling the Abyssinian highlands. A settlement policy such as was practised in the past, with a more or less disordered and chaotic affluence of land seekers, will no longer

be tolerated. Demographic colonization as conceived by Fascist Italy consists in the orderly development of preconceived plans, followed assiduously and under supervision.

Land situated near the centres of Harar, Dire Daua, Addis Ababa, Gimma, Gondar and Dessie has been granted to ex-service men and demobilized workmen of the peasant class who have invested their savings in these holdings. These, however, are exceptional cases. The majority of the settlers belong to the 'nulla tenenti' group, therefore, they are individuals who could never otherwise go in for farming. As in the case of land improvement work in Italy and the colonization of Libya, the organization of all settlement work is entrusted to the 'enti', wich are regional or military associations.

Before discussing the first settlements, it is necessary to give some indications on the climatic conditions of the Abyssinian highlands. The plateau zone situated at altitudes varying from 5905.5 feet to 9186 feet, in Abyssinia called the Yoina Degà, extends from the plateau of Lake Margherita in the south up to the Asmara region in the north, from Harar in the west up to the Sudanese slope in the east. The isotherm map published in the work of AMILCARE FÀNTOLI gives an idea of this region which is approximately circumscribed by the isotherm of 68° F. The region comprises Asmara and Addis Ababa, for which meteorological observations covering a period of several years is available. Addis Ababa has an annual mean temperature of 61/92° F with averages of 65/52° F. for the hottest month, May, and 58/28° F. for the coolest month, December; Asmara has an annual mean temperature of 62°06 F. with averages of 65°84 F. for the hottest month, May or June, and 57°56 F. for the coolest month, November. Throughout the region, there are dry and wet seasons, very pronounced, but which vary according to locality. The annual rainfall at Addis Ababa averages 49 inches, with 35.7 inches in the rainy season which begins in May and ends in September. Asmara is drier: the annual mean only amounts to 19.3 inches, of which 13 inches fall in two months, July and August. Another characteristic of the climate is the extreme nebulosity, especially in the wet season.

The old colony of Eritrea offers in the uplands climatic and ecological conditions fairly similar to those prevailing in Abyssinia properly so called. These plateaux, however, are not available for demographic colonization because the land in question is already occupied by the natives and fully exploited. The land tenure system in Ethiopia did not differ much from that in Eritrea. Some solution, therefore, had to be found.

Three categories of land have been declared State property: (*a*) Confiscated and sequestrated land; chiefly land formerly belonging to the Negus and his family; (*b*) land legally considered 'res nullius', that is land on which the natives do not assert their right of property, chiefly forest-land; (*c*) land which, according to the opinion of the Government of the Territory, can be declared for one or the other reason State property.

Demographic colonization is of very recent date. It is the 'Opera Nazionale Combattenti' which is responsible for the development of the Oletta and Biscioftu areas situated close to Addis Ababa. Groups of settlements have been established. The land belonging to each farm is laid out in the form of a triangle,

Eight of these triangles are joined in a quadrangle, the houses being placed in the centre. This system was employed as a protective measure. Each farm comprises about 120 to 145 acres. The crops grown will be wheat, barley, maize, linseed, vegetables, forage plants and fruit trees. The peripheral part of the farm is reserved for pasture. Considerable importance is attached to stockfarming for the production of meat and draught animals. Two native families are to be allotted to each Italian family chiefly for the preliminary clearing work. Oletta covers 29,653 acres, 13,343 acres of which had been granted to the settlers in 1939 The difficulties involved in irrigation work, etc. were much greater at Biscioftu than at Oletta

There is another type of settler the metayer or share tenant, carefully chosen by the Migration and Colonization Board of the Ministry of the Interior. Two 'enti' have been formed, the one to settle peasant families from Romagna in the Uoghera (Asmara Plain), the other to settle families from Apulia in the Uaccio Valley (Harar). Each company or 'ente' has been granted a loan of 50 million lire. In 1938 (according to QUARANTA) 330 heads of families and fifty skilled artisans engaged for building the farmhouses had arrived at the settlement area. The 'enti' house and board the future settlers until the houses are completed; the settlers are provided with free medical assistance and are paid regular wages plus insurance So far 45 settlers have been joined by their families, each averaging seven persons. The Romagna settlements have communal bakeries, while the Apulia company prefers to equip each farm with a baking-oven. The Romagna farms each cover about 125 acres and the settlers have decided to employ native labour. The farms of the Apulia 'enti' are smaller, being about 60-65 acres each, as the settlers have decided against the employment of native labour. Wheat, barley, maize, durra, vegetables, also citrus and coffee are the crops in prospect.

It is evidently impossible, after such a brief period, to judge of the success of this large scale demographic colonization, either from the viewpoint of acclimatization or from the economic standpoint. As to the possibility of the white to live in Abyssinia and to do heavy manual labour, the best proof has been given by the Italian roadmakers who, under the difficult conditions of war, constructed hundreds of miles of roads. Two serious problems, however, have still to be solved, that of the acclimatization of the families of the settlers, including the question of the influence of climate on their descendants, and that of the economic competition of the native in agricultural production.

Finally, there is the very interesting example of white settlement in the tropics — Queensland. The other white settlement in the tropical regions of Australia will not be treated as they are of little importance. The reader interested in this question will find detailed information in the work of GRENFELL PRICE.

New Caledonia deserves mention as a white settlement, though unfortunately no recent and complete documentation on the French demographic colonization of this island is available.

**Queensland.**

(See A. GRENFELL PRICE, D. HARWARD, A. LODEWYCKX, W. WYNE WILLIAMS, GRIFFITH TAYLOR). In speaking of Queensland as a region of white demographic colonization, the narrow strip of lowland along the Pacific coast is intended. The steep slope rising up to about 3,280 feet which separates these plains from the tableland of the interior, condenses the clouds and thus explains the abundant rainfall of this region, the most humid of all Australia. The rainfall decreases rapidly inland. In this littoral zone, humid and hot, lives a white population of about 179 000, that is, 71 per cent. of the whites in the tropics of Australia. Rockhampton on the tropic of Capricorn and Townsville each carry populations numbering about 30,000; Cairns, the most northerly port, 13,000. The tableland, the stock-raising area, is much more sparsely populated than the littoral

The climate is characterized by the following data regarding Mackay, situated at an altitude of 36 feet a little to the north of Rockhampton: annual mean temperature· 72/14 F.; average of the hottest month, January, 79/52 F.; average of the coolest month, July,. 62/24. Annual mean rainfall· 75 inches with a very pronounced wet summer season. Humidity is very high, averaging 83 per cent. The climate, therefore, is the *C w* type of KÖPPEN (*C*: the temperature of the coolest month varies between 64/4 F. and 26/6 F; *w*· dry winter season). On advancing to the North or to the South, conditions change. The climate at Cairns, a northern town, is purely tropical, with an annual mean temperature of 75° F, average temperature of 82° F. for the hottest month and 70° F. for the coolest month and a rainfall of 87.7 inches, while Brisbane is definitely subtropical, with a more even rainfall distribution than Rockhampton.

The development of this region began about the middle of last century. South Queensland had already attracted many settlers when it was decided to introduce tropical crops, in particular sugarcane, into the northern zone. The first plantation owners introduced coloured labour, Kanakas from the Pacific Isles. More and more were introduced with the extension in cane cultivation, a crop for which conditions were very favourable especially on the alluvial soils along the many rivers, but also on the hill slopes. In 1871, there were 27,000 working in the fields and mills north of latitude 24° S. In 1872, sugar exports valued £ 37,803; in 1880, this value increased to £ 286,223.

The plantation system was improved, especially in 1885, when the many small individual mills were replaced by large central mills which bought the cane from the small cane growers. Towards the end of the last century, the large estates were divided up into small farms.

At that time, the cane plantations in Queensland were very severely criticized by the other States of Australia. Two arguments against coloured labour were used: (1) the undercutting of the white workers who, in the past century, had worked in the cane plantations; (2) the incidence of disease and death which afflicted the Kanakas; from 1870 to 1875, the average mortality of Polynesians was 70.9 per 1000; the situation subsequently improved, but Queensland

had a bad reputation as being the most unhealthy state of Australia; the ever increasing danger to the health of white settlers living among a coloured population was seen.

After the foundation of the Australian Commonwealth in 1901, the policy of a white Australia was rigorously pursued; the Kanakas were repatriated and their place taken by white plantation labourers. From this moment the Australian Government applied a protective tariff in order to make the sugar industry pay and thus to safeguard the existence of the white settlers. The wages of the white workers being very high in comparison with those paid to Polynesian labour, it was necessary to avoid all competition with the product of the neighbouring countries—Java, the Philippines— where production costs are low owing to the exclusive use of coloured labour. The obligation of supporting the Queensland sugar industry has, since then, become one of the fundamental principles of the Australian policy, principle expressed in 1912 by the Federal Royal Commission in these terms ' The problem of the sugar industry is not a problem of industry, or wealth or production; it is primarily and essentially a problem of settlement and defence '.

A considerable change took place after 1906. The woes predicted by the pessimists did not come true. On the contrary, the white worker showed himself capable of manual labour of any kind, even the most exhausting, at the same time enjoying good health and having children in a tropical climate. Today the entire sugar crop of Queensland, ranging between 700,000 and 800,000 tons, is exclusively produced by means of white labour.

The wages are high, considerable importance being attached to adequate diet and confortable housing. DOROTHY HARWOOD states that the minimum wage of cane cutters in 1923 was £ 5 per week from June to December. From December to April work can easily be obtained at the docks for an average of £ 6 per week. More recent figures are given by W. WYNE WILLIAMS who states that out of a total of 250,306 persons living in Queensland at that time, 133,282 (women and children) had no income, 30,937 had under £ 52 (Australian) per annum, 63,532 had from 52 to 259 Australian pounds per annum and 17,683 had £ 260 or over.

It is evident that it is the Australian Commonwealth that has, in the end, to pay these high wages, but this is a common effect of all self-sufficiency policies. In 1936, the average net price of sugar in Australia was £ 24.2.0 compared with the world price of £ 7.19.0. Recently, following the same protective policy, the production of fruit, maize and cotton, crops introduced subsequently to sugarcane, has been stimulated, as also the dairying industry of the inland tableland.

What is the health and state of physical and mental development of the population of tropical Queensland? A very complete answer can be given to this question thanks to the careful investigations made by many doctors, one of the best known being Sir RAPHAEL CILENTO.

A scientific enquiry undertaken in 1924 shows that, contrary to expectations, the white residents, even those of the second and third generations, equalled the new immigrants in physical strength and health. Tropical native-born women averaged larger families than immigrant women. The healthiest people were

those who did the hardest manual work. These results were obtained in spite of the fact that many of the houses were unsuited to the tropics. The 2080 school children examined showed no signs of mental deterioration. In weight they were almost identical with American or English normals and were taller than the latter. It was reported in 1920 that the work accomplished by a gang of white cane cutters equalled that of any other workers.

The birth and death rates are satisfactory, especially if compared with those of the period previous to 1901. They are even better than those in the European countries having the most satisfactory percentage. GRENFELL PRICE for 1929 gives the following figures regarding the tropical zone of Queensland; he compares them with the figures for all Australia (figures in brackets): birth per 1000 of mean population: 21.20 (18.38), death rate per 1000. 8.37 (8.81), infant mortality rate (under one year) per 1000 births: 44.54 (44.26). The progress made since the abolition of Polynesian labour is enormous. In the last century Queensland had the highest death rate of all Australia.

The many favourable factors present in Queensland, but which, for the most part, are not found in other white settlement regions in the tropics, however must not be forgotten. These are (1) relatively cool and dry winters; (2) the trade winds which blow off the ocean and benefit the cane-growing area to a considerable extent, (3) mountain stations easily accessible by rail or road; (4) absence of a native population and of coloured labour; (5) almost entire absence of tropical diseases, (6) effective control of the diseases brought into the country in the past by the Kanakas, (7) continual improvement in the standard of life (housing, diet); (8) high wages, and (9) the composition of the white population the majority having been born in the country and consequently acclimatized since birth.

Medical opinion is divided on the following points. Opinion differs, as regards the influence of heavy manual labour on the health of the worker, as some doctors affirm that heavy physical work cannot be continued for more than eight years, though this concept is far from being generally accepted. Investigators are not unanimous as regards the question of the influence of tropical climate on the intelligence of whites. Sport plays an important part in their life; it is owing to sport and heavy physical work that both men and women, according to an opinion frequently expressed, easily support the tropical climate. As elsewhere, the decided effect of the climate can be noted on the growth of the children who, up to about sixteen years, show a more rapid physical and mental development than those in temperate zones. Some experts consider that there is a falling off after sixteen; others differ.

Diet is good, although not enough milk and green vegetables are consumed. As in most tropical countries, there is too much abuse of alcohol. Housing has improved considerably, but still leaves much to be desired, primitive houses are not suited to the climate; roofs in galvanized iron, veritable accumulators of heat, have not yet disappeared.

The greater part of the population are of British origin. In the sugar regions, however, there is a small percentage of foreigners, chiefly Italians.

Doctor CILENTO considers that, under the influence of the tropical climate, there is beginning to develop a definite type of North Queenslander, type characterized by tallness with long extremities. The Queenslander seems sparsely built, but is not inferior in muscular strength to the Southerners. The North Queenslander moves slowly, giving the impression that he wishes to conserve his muscular energy as much as possible One can pick him out in the streets by his deliberate walk. In the women this becomes a gracefulness of movement. The pallor of the skin suits the dark-haired women, though it is unkind to the fair-haired.

The future of white settlement in Queensland depends on the introduction of new crops and the industrialization of the country. Monocultivation, in this case sugarcane, while having created an adequate living standard, constitutes a danger even taking into consideration the favourable conditions of marketing.

**Conclusions of the second chapter.**

The white settlements reviewed above have very little in common, they differ in pratically every respect It is possible, however, to draw some general conclusions

Contrary to general opinion the peasant settler of the white race, whether Mediterranean or Nordic, supports the tropical climate, he can not only live in the tropics but also maintain his family The Spanish established at Puerto Rico and Costa Rica, the English, French Dutch and German in the West Indies and South America, finally the Anglo-Saxons and Italians in Queensland, all demonstrate the capacity of the white man to become acclimatized in tropical countries and to make a living for himself and his children. In the past, white settlements resisted in spite of the unsanitary conditions which caused a very high death rate The discoveries on the nature of infectious diseases and the progress made in medical science improved the sanitary condition of the old settlements and promoted the establishment of new communities. In the next chapter, the birth and death rates, the principal diseases in the different colonies, as well as the changes in the somatic type of the white under the influence of tropical climate will be gone into greater detail.

It should be noted, however, that the climate of the white settlement zones is not, in general, the same as in the tropical plains, the majority of the settlements being situated either on high-lying land or on islands where the high temperature and humidity are tempered by winds. The only exception to this rule is the Dutch settlement in Surinam.

The absence of a numerous native population appears to be a necessary condition for the successful development of all endeavours at colonization by whites.

The cultivation of industrial or export crops such as: coffee, tobacco or sugarcane constitutes, in all cases, the economic basis of white colonies The cultivation of food crops or stockfarming is never sufficient to cover all the requi-

rements of the settlers. Industrial crops sometimes predominate to such an extent that the food products in daily use have to be imported. No example of a white settlement in the tropics which can completely meet its own requirements is known.

Judging from past experience, it seems that chiefly economic and not health reasons limit the extension of white settlements, even in zones where the climate assures the settlers a salubrious life.

## III. Effect of climate; adaptation; diseases.

In a not far distant past when speaking of the influence of tropical climate on the human organism, the influence of climate *per se* was not clearly distinguished from that of many diseases, the parasitical nature of which was not recognized until about the end of the XIXth century. In reality, it was not the climate but the diseases, such as yellow fever, malaria, hookworm and others, which passed as the restricting factors in white expansion and which only allowed the settlers a precarious existence. (See CASTELLANI, DIETZEL, VANEVER, DINGEN, HELLPACH, RODENWALDT, SALVADORI, WINCKEL, GROBER).

The campaign against yellow fever, conducted during the construction of the Panama Canal, campaign during which the destruction of the mosquito *Aëdes aegypti* was systematically carried out, proved that it was possible completely to eliminate a disease, previously considered the greatest menace to white colonization.

The discoveries of LAVERAN, GOLGI and other scientists made known the parasites which cause malaria. GRASSI and ROSS showed that the control of mosquitos, transmitters of *Plasmodium*, constitutes the chief prophylactic measure; this control should take the form of precautionary measures, either by avoiding stings during the dangerous hours (evening, night) or by destroying the larvae. It has long been known that quinine is an efficacious remedy and an excellent prophylactic measure. There are now other remedies besides quinine; these have been successfully employed in special cases. All this, however, does not prevent malaria still remaining one of the most serious scourges of humanity because economic conditions frequently do not permit the settlers to sustain the very considerable expense of complete and effective control. There are always some regions uninhabitable because of paludism. It would be exaggerated, however, to consider malaria as a decisive factor in the success or failure of any of the white settlements examined above.

Hookworm is one of the diseases, the cause and clinical symptoms of which are fully known. From the investigations of LOOSS in Egypt and CLAUDE A. SMITH in the New World, the mode of infection is also known: the larvae of nematodes, *Ankylostoma duodenale* in the Old and *Nacator americanus* in the New World, which sojourn in moist and warm soil, penetrate into the skin of man arriving after a long migration through various organs into the intestine. Where

there are no latrines, the eggs are deposited on to the ground with the faeces, and the larvae, which develop after a certain period, constitute the chief source of infection, particularly for persons who always go barefoot. The white is generally much more susceptible to infection than the black. A general debilitation and pernicious anaemia are the very evident symptoms of those seriously infected. Light infection may pass quite unobserved. The very thorough campaign against *Necator* conducted with the assistance of the funds donated by JOHN D ROCKEFELLER has led to the practically complete elimination of hookworm in the southern states of the United States The construction of adequate latrines and the distribution of footwear are relatively simple measures of control and apparently easy to apply. It has been seen, on the contrary, that European peasant settlements, such as that of the Germans at Espirito Santo, continue to suffer from hookworm, the importance of systematic control measures not having been realized.

Consequently, the putting into practice of sanitary measures is often checked by economic difficulties or by the indifference of the settlers. It may be affirmed, however, that tropical diseases are now no longer the decisive obstacle to colonization that they were a hundred years ago The first duty of all colonization enterprises, whether State or private, is, with the assistance of physicians, to take all precautionary measures known today, as well as providing adequately equipped modern hospitals for the sick.

Apart from diseases, does the tropical climate *per se* exert a harmful influence? Does this influence constitute a real obstacle to the expansion of white settlement in the tropics? These are the important questions to which a precise answer cannot be easily found. The Proceedings of the Geography Congress at Amsterdam comprise several articles by eminent medical men and hygienists from which various points of interest stand out.

One of the contributors, E. RODENWALDT, consults history History shows that all the Nordic races who emigrated to the southern hot countries, as also the Persians, Mitani, Chetites, Philistines, Greeks, Romans and finally the Germanic peoples of the great migration, were absorbed in the course of time by other races. They have disappeared or no longer manifest today any sign of autonomous activity. Thus history would appear to have demonstrated beyond doubt that the regions permitting the white race a vigorous and dominant life are limited to the temperate zones.

In the long run, white people in the mass do not seem to be able to become acclimatized in the tropics, while individual adaptation is frequently observed. The Mongol race is different. One who has seen and watched the turbulent life of the Chinese quarters in towns like Singapore or Batavia and the intense activity in the rural centres populated by Chinese in Malaya and the Netherlands Indies is impressed by the great power of adaptation of the Mongols of whom only part come from South China, that is from a subtropical region. Millions of the yellow race have become established in these countries at the side of a few thousand whites, the majority of whom are only temporary residents in the colonies.

These are the generalities, well known moreover, the true causes of which one would like to know. Physiology as yet cannot give any definite answer to the question of adaptation which depends on the influence of climate on the functioning of the human organism. It is seen, however, from the investigations made in the Netherlands Indies, Queensland, Brazil and elsewhere, that many of the functions of the body, under the influence of a tropical climate, in reality undergo considerable changes. Dr. WINKEL summarizes the observations of different medical men and physiologists as follows:

(1) The composition of the blood is the same in the tropics as in temperate regions. Some observers claimed to have found modifications due to climate; other specialists, however, hold a different view and attribute these changes, when present, to differences in diet and not to the influence of climate.

(2) 'Basal metabolism' is defined as the metabolism of a person at complete rest and 12 to 15 hours after the last meal, expressed in calories per square metre of the body surface. This basal metabolism is, in the same person, lower in the tropics than in Europe.

(3) Under the climatic conditions of the low-lying regions, body temperature is slightly higher than in Europe, this difference, however, only averages 0.54° F.

(4) The urine is more concentrated than in Europe, consequently its specific weight is higher.

(5) The blood pressure, as also the carbonic acid tension in the lungs may be slightly lower in the tropics than in Europe.

(6) In many cases, instability of different vegetative functions has been found, but it is not certain if this instability is actually due to the tropical climate or merely accentuated by change of environment.

A sojourn in the tropics, therefore, undoubtedly influences the functions of the body. The changes observed are due to 'climate' in general, without it being possible at present, to distinguish the specific influence of the different elements composing it: heat, humidity, rainfall, electricity of the air, etc. It would be erroneous, however, to qualify *eo ipso* these changes as being harmful to the regular functioning of the human organism; on the contrary, they could be considered as modifications enabling the body to adapt itself more easily to new environmental conditions.

Returning to the main subject — white settlement in the tropics — it may be asserted that the difficulties of adaptation are far from constituting a serious obstacle to the establishment of white settlements. It is evident that at the beginning of any settlement a natural weeding-out necessarily takes place which automatically eliminates the individuals incapable of adapting themselves to the climate.

Of late, it was thought possible to facilitate adaptation by creating inside the houses atmospheric conditions more favourable than those outside. Air conditioning of the houses found many partisans who believe that resting in cool and well ventilated rooms contributes to the well-being of residents in hot coun-

tries. Not wishing to belittle the importance of recent progress in this field, it would seem however, that the expense involved in constructing air-conditioned houses together with the cost of electric installations is prohibitive for the peasant farmer who, in general, has to live as cheaply as possible at the beginning. On the other hand, it is evident that, in the future, the mistakes in rural building (galvanized iron roofs, absence of latrines, etc.) committed in the past will be avoided

The influence of tropical climate on the nervous system of whites has often been discussed in the medical world Doctors working in the Netherlands Indies have described nervous disorders as tropical neurasthenia (VAN LOON) and leiodystonia (VAN WULFFEN PALTHE), apparently due to the tropical climate. Other investigators doubt the specifically tropical character of the disorders described. There are also the nervous disorders observed in white residents in Kenya after a prolonged sojourn, mention has already been made earlier in this article (see p. 230) A more or less harmful influence on the nervous system of the white produced by a prolonged stay in the tropics, therefore, appears to exist. This influence, however, has only very occasionally been observed in the descendants of the white settlers The whole question, however, is far from being solved observations should be supplemented and controlled.

It has repeatedly been shown in this study that the white is capable of manual and even heavy physical labour in the tropics This fact well proved by the workers in the cane plantations of Queensland, by the German settlers of Espirito Santo and by many other examples contradicts the opinion frequently expressed to the contrary. In each case, there was no competition from workers of other races The majority of the Queensland doctors consider that heavy manual labour has no detrimental effect either on plantation workers or on dock labourers

What is the influence of tropical climate on the fecundity of the white woman and on the white descendants? The climate is far from causing, as was frequently thought, sterility in the white woman. On the contrary, the white settlements all show a very high birth rate. Nearly all the white settlers have very large families. A fairly high infant mortality rate often corrects the tendency to a too rapid increase in population.

It is probable that there is a well determined somatic type of white child born in the tropics; the most striking characteristic is the rapid development during the early years of life. The suppleness of the limbs and light weight are also common characteristics. As regards the intellectual capacity of white children, investigators do not agree. It would, however, be erroneous to suppose that a lower standard of intelligence was the automatic consequence of tropical climate, taking into account especially the lack or inadequacy of educational facilities in the majority of tropical countries. The want of energy in the children of white settlers has often been reported, but observations are too few to permit any generalization on the question.

**Conclusions.**

When, in the past, the harmful influence of tropical climate on the white was discussed, no distinction was made between the effect of diseases, the parasitical character of which was not recognized until the end of the XIXth century, and the influence of climate as such. To day, the infectious nature of the chief tropical diseases is known, and control as well as prophylactic measures are also known. Disease control, however, often comes up against economic obstacles. In the main, diseases are no longer an obstacle to white settlement, with the exception of really unhealthy regions, as, for example, the Amazon Basin.

The problem of influence, from the physiological standpoint, of tropical climate on whites is far from being solved. The investigations made, hovever, only indicate some obstacles due to the phenomena of adaptation which affect white settlement.

The descendants of white settlers have acquired certain characteristic somatic traits. These characteristics, certainly, cannot be considered as signs of degeneration.

## IV. - Economic problems.

It seems to be agreed that, in our time, neither diseases nor difficulties of acclimatization constitute an insurmountable obstacle to white settlement in the tropics. On the other hand, the factors limiting white colonization are frequently due to economic difficulties.

Some important industrial crop is nearly always the basis of a new settlement sugarcane, coffee and tobacco were the chief means of existence of the Puerto Rico whites. The island was not sufficient to supply their own requirements, and the greater part of their food was imported. The white settlement in Costa Rica would not have become important without the cultivation of coffee. In the same way, the German settlers of Espirito Santo depend on their coffee crop for all their requirements with the exception of foodstuffs. They are the only settlers who, owing to a very fertile soil, produce practically all their food on their own farms. It has been seen, however, that the soil is exhausted after being worked for half a century and that the occupiers are forced to seek and clear fresh land. Sugarcane was the fundamental basis of the white colonization of tropical Australia.

These facts contrast with the ideas of the colonization propagandists. The latter evoked a peasant life in the tropics similar to that in the old countries, where the farm would cover daily requirements and the income obtained from an industrial crop would suffice for the purchase of all other indispensable commodities. The 'fertility of tropical soils' would enable the settlers to have an easy and comfortable life. Reality is quite different. Two contributors at the International Geography Congress at Amsterdam, C. J. J. Van Hall and M. B. Smits did a service in demonstrating, by concrete figures, the low yields of food crops in the tropics and the considerable number of working hours required for field work as compared with Europe.

The figures of unit yield cited by VAN HALL refer to food crops grown both in the tropical and temperate zones of the globe. The following are typical examples:

(a) *Rice*, yield in qls per hectare (figures for 1939-40).

| Temperate zone | | Tropical zone | |
|---|---|---|---|
| Spain | 41 4 | Surinam | 23 0 |
| Italy | 55 0 | British Guiana | 28 4 |
| Portugal | 35 0 | Mexico | 20 3 |
| Turkey | 22 7 | Burma | 14 6 |
| U. S. S. R. | 19 4 | Ceylon | 9 4 |
| United States | 25 4 | India | 13 2 |
| Japan | 40 4 | Indochina | 11 9 |
| Korea | 21 8 | British Malaya | 17 6 |
| Manchoukuo | 22 3 | Philippines | 11 9 |
| China | 26 5 | Thailand | 15 9 |
| Egypt | 38 6 | Netherlands Indies | 15 3 |
| | | Madagascar | 9 0 |
| | | Brazil | 13 9 |
| | | Peru | 21 6 |

(b) *Maize* (same figures)

| | | | |
|---|---|---|---|
| Bulgaria | 7 6 | Mexico | 5 5 |
| Spain | 18 9 | India | 9 0 |
| France | 17 0 | Indochina | 15 3 |
| Greece | 9 4 | Philippines | 7 3 |
| Hungary | 18 5 | French West Africa | 7 7 |
| Italy | 19 5 | Brazil | 13 8 |
| Portugal | 7 5 | Netherlands Indies | 9 0 |
| Rumania | 12 3 | Angola | 5 1 |
| Yugoslavia | 15 1 | | |
| United States | 18 5 | | |
| China | 13 2 | | |
| Manchoukuo | 15 4 | | |
| Turkey | 12 7 | | |
| Egypt | 23 4 | | |
| Argentina | 15 3 | | |

(c) *Soybean* (same figures).

| | | | |
|---|---|---|---|
| China | 12 0 | Netherlands Indies | 7 0 |
| Japan | 10.7 | | |
| Manchoukuo | 12.0 | | |
| United States | 13 9 | | |

It may be objected that the yield in tropical countries is lower than in temperate regions because of the lower standard of cultivation adopted in the tropical rice-fields; this objection, however, does not stand, as, particularly in the important Asiatic rice centres, Burma, Java, Indochina, every attention is given to the crop. In the experiment fields in Malaya, moreover, it was found impossible to obtain the average Italian yields even with the application of all the expedients of intensive cultivation. In reality, climate and soil are the chief factors which influence yield.

VAN HALL compared the total yields, yield in albumen, carbohydrates and fat per unit area of some crops of the temperate zone (potatoes, wheat, colza)

with some tropical crops (rice, groundnuts). He always came to the same conclusion: yields in temperate countries are always higher than those in tropical countries.

There are some regions in which it is possible to have two crops a year, but these are exceptions, as in most cases the alternation of the seasons, wet and dry, signifies an alternation in vegetation and rest period, corresponding to the seasons of temperate countries.

M. P. Smits compares the working hours of man and draught animals per hectare of irrigated rice in Java with those for rye, peas and haricots in Holland. As regards irrigated rice in Java, the number of working hours for man (*a*) are calculated as varying between 559 and 1064 and for draught animals (*b*) at between 54 and 250; the yields (*c*) vary between 15.2 and 22.8 quintals. For the crops in Holland, the corresponding figures are: rye (*a*) 213, (*b*) 219, (*c*) 25.5 qls.; peas (*a*) 212, (*b*) 69, (*c*) 32.5 qls.; haricots (*a*) 332, (*b*) 32 (*c*) not determined. In the tropics, it is chiefly weeding which takes up so much time.

An average of 800 working hours is required for the cultivation of a hectare of rice-field which produces 1600 kg. of dry rice, unhulled. One working hour, therefore, yields about 2 kg. of rice. In favourable years, the price per kg. is calculated at 4 or 5 Indo-Netherlands cents; consequently, the income per working hour normally corresponds to 8 to 10 cents; but during periods of depression, it hardly reaches 4 cents. It is evident that even the most sparingly living European farm worker could not exist on such a low wage.

These figures on Java have been given without any wish to draw general conclusions. It should be noted, however, that Java is one of the relatively fertile tropical regions and that the standard of native agriculture are comparatively high. It is to be regretted that investigations on yields and on labour requirements have not been made elsewhere. The problem of economic self-sufficiency in white settlements necessitates an exhaustive up-to-date study, study for which the basic statistical and economic data are incomplete.

The contribution of white settlers to total agricultural production in the tropics is insignificant. Among the chief export crops, only sugar, tobacco and coffee are produced by the whites. Neither tea, rubber, cotton nor cacao, to cite some examples, are produced by them. The sugar exports of Queensland and Puerto Rico are of little importance on the world sugar market. On the other hand, the Brazilian coffee of Sao Paulo represents about 60 per cent. of world production, a crop which is realized through white labour only. But here, as has already been shown, it is a question of a tropical product cultivated, from the viewpoint of climate, in a subtropical region.

All the large estates created in the present century, rubber in Malaya and the Netherlands Indies, cacao in West Africa, oil palm in Sumatra and Malaya, cotton in tropical Africa and others, are due to the initiative of capitalistic companies or to the natives. No similar initiative has been taken by the white peasant settler who, moreover, had not the necessary capital to open up new avenues of development.

In South America, the part played by the half-breed in the clearing and development of the land is relatively little known. Certainly, it is more impor-

tant than that of the pure white settlers. It is impossible to say whether this will continue to be so, but it would seem, according to past and present experience, that the tropics cannot be considered as capable of absorbing surplus white population, particularly agricultural.

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# *INTERNATIONAL CHRONICLE OF AGRICULTURE*

## ROMANIA

Very important political changes took place in Romania during the year 1940 and their repercussions were felt throughout every branch of the country's activity.

The events resulting from the war will be dealt with in the first place. The outbreak of hostilities in the Mediterranean closed the sea routes to Romanian trade, causing serious obstacles to exports and even more serious difficulties in connection with the country's supplies. Many products which are essential either to industry or for direct consumption are not found on the home market. In this connection it will suffice to mention the almost complete disappearance of cotton, for instance, which was used extensively on the small farms before the war and particularly the absence of Manilla hemp which makes it impossible to operate mechanical harvesters. The increased use of labour to fill this gap will thus cause a rise in cereal prices.

In order to compensate the absence of certain products, Romanian agriculture is now attempting to introduce the cultivation of new plants, especially of cotton and rice, and is also trying to develop the cultivation of others, such as flax, hemp and sunflower.

In the second place the cession of Bessarabia, Northern Bukovina, Northern Transylvania and Southern Dobrudja has reduced Romanian territory by more than one-third. Regions which were extremely rich in cereals, wine and fruits have been lost and Romanian economy, which formed an organic whole, has been thrown out of balance.

Romania has lost 99,738 sq. km., or 33 80 per cent. of her national territory, with a population of 6,821,000, i. e. 34.20 per cent. of the total population. The following figures show her losses in agricultural land·

| | | | |
|---|---|---|---|
| Arable land | 37 | per cent. | of the total |
| Forests | 44 | » | » |
| Orchards | 27 | » | » |
| Vineyards | 37 | » | » |
| Unproductive land | 32 | » | » |

Losses in crops are as follows·

| Crops | Losses in % of the cultivated area in 1939 | Losses in % of the 1939 output |
|---|---|---|
| Wheat | 36.7 | 31.9 |
| Maize | 30.1 | 24.0 |
| Barley | 46.9 | 41.2 |
| Oats | 30.3 | 31.1 |
| Sunflower | 75.3 | 72.7 |
| Colza | 71.5 | 34.6 |
| Hemp | 43.0 | 44.0 |
| Flax | 20.2 | 14.8 |
| Soya | 86.1 | 86.7 |
| Tobacco | 38.2 | 37.9 |

At present the Romanian Government are making every effort to reorganize the country's economy, they are trying so to raise the agricultural output as to ensure home consumption and the necessary minimum for export as well as the satisfactory operation of the administrative apparatus in order efficiently to control home trade, industry etc

During the past year Romanian agriculture had to endure very severe climatic and economic conditions The very heavy rainfall and, above all, a constantly low temperature had a very adverse effect upon sowings and field work Owing to mobilizations and requisitions there was a shortage of labour and draught animals

The output of the principal crops —wheat and maize—both as a whole and per unit of area sown, was lower than that obtained during the agricultural year 1938-39

The table given below is based on figures supplied by the Ministry of Agriculture and offers a comparison between area and production of the chief crops for the years 1938-1939 and 1939-1940, the figures apply to present-day Romanian territory.

*Area and production of cereals in Romania in 1938-1939 and 1939-1940*

(territory as of January 1, 1941)

| Crop | Area sown (in 1000 hectares) | | Total (in 10 ton trucks) | | Output per hectare (in quintals) | |
|---|---|---|---|---|---|---|
| | 1938 39 | 1939-40 | 1938 39 | 1939 40 | 1938 39 | 1939 40 |
| Wheat | 2,552 | 2,078 | 278,137 | 157,469 | 10 90 | 7 58 |
| Maize | 3,405 | 3,575 | 426,235 | 422,585 | 12 30 | 11 82 |
| Rye | 123 | 92 | 11,772 | 9,757 | 9 57 | 10 65 |
| Barley | 594 | 588 | 43,954 | 61,862 | 7 40 | 10 52 |
| Oats | 401 | 434 | 33,264 | 77,088 | 8 30 | 17 70 |

Since the total output of wheat in 1939-40 was not sufficient to meet the civil and military requirements, the Govèrnement decided to adopt a series of measures for the purpose of ensuring the country's needs. Among the principal measures adopted mention may be made of the following prohibition of wheat exports, baking of wholemeal bread, prohibition of consumption of freshly baked bread, baking of wholemeal bread containing a given proportion of maize flour, etc.

In order to ensure supplies for home consumption and possibly for export, steps were taken in due time concerning sowings and coordination of crops during the current year.

The prices of all products have been rising steadily owing to the difficulties encountered by imports from abroad, to the bad harvest at home, to political changes which have led to a decrease in the country's territory, and to the increased consumption due to the keeping of troops on a war footing.

The price index, based on figures compiled by the State Institute for General Statistics, will be seen from the following table (1933-100).

The greatest rise took place in foodstuffs, followed by clothing and then by fuel, and miscellaneous.

As regards the prices of the principal agricultural products, the situation will be seen from the table given below.

The rise was most marked in the prices of wheat: from 454 lei per quintal on the home market in January, 1940, they rose to 851 lei per quintal in Juanuary, 1941. As a result of the prohibition of exports, quotations at Braïla were slightly lower.

TABLE 2. — *Index numbers of prices in Romania*
(1933 = 100)

| Year | General Index | Foodstuff | Clothing and shoes | Fuel and miscellaneous |
|---|---|---|---|---|
| 1936 | 107.8 | 117.5 | 90.8 | 96.9 |
| 1937 | 115.5 | 122.9 | 103.7 | 106.2 |
| 1938 | 127.7 | 134.6 | 115.3 | 120.5 |
| 1939 | 137.6 | 142.7 | 135.8 | 123.3 |
| 1940 February | 171.7 | 173.0 | 182.2 | 148.5 |
| March | 173.8 | 175.5 | 190.5 | 148.0 |
| April | 179.7 | 183.4 | 188.2 | 157.7 |
| May | 185.9 | 192.2 | 188.2 | 163.0 |
| June | 193.9 | 199.2 | 188.9 | 183.0 |
| July | 195.0 | 205.5 | 188.9 | 184.7 |
| August | 209.8 | 218.1 | 201.1 | 194.0 |
| September | 215.5 | 222.9 | 213.5 | 194.0 |
| October | 228.4 | 242.0 | 213.5 | 202.9 |
| November | 228.8 | 247.9 | 214.1 | 185.5 |
| December | 233.0 | 253.2 | 218.4 | 185.5 |

TABLE 3 — *Movements of prices of the principal agricultural products.*
(Lei per quintal)

| Year | Wheat | | Barley | | Oats | | Maize | |
|---|---|---|---|---|---|---|---|---|
| | Price at Braila | Price on home market | Price at Braila | Price on home market | Price at Braila | Price on home market | Price at Braila | Price on home market |
| 1936 | 485 | 403 | 262 | 242 | 266 | 273 | 262 | 250 |
| 1937 | 525 | 460 | 361 | 328 | 324 | 356 | 316 | 312 |
| 1938 | 479 | 451 | 314 | 338 | — | 430 | 312 | 335 |
| 1939 | 435 | 436 | 360 | 348 | 438 | 448 | 410 | 378 |
| 1940 | 648 | 663 | 436 | 447 | 466 | 570 | 499 | 502 |
| 1940 January | 472 | 454 | 415 | 367 | 402 | 507 | 444 | 341 |
| April | 586 | 612 | 440 | 425 | — | 590 | 492 | 469 |
| July | 560 | 622 | 380 | 455 | — | 653 | 525 | 529 |
| October | 824 | 831 | 455 | 422 | — | 485 | 490 | 555 |
| 1941 January | 825 | 851 | 510 | 507 | — | — | 590 | 574 |

## Foreign trade.

*Evolution.* — Romanian foreign trade passed through a very difficult period during 1940 and the first months of 1941.

The country's territory having been reduced, the possibilities of export diminished considerably. Moreover the wheat crop was poor and home consumption increased considerably.

The volume of both exports and imports was very small in comparison with the 1939 figures. The prices obtained, on the other hand, were higher than in 1939 and, in consequence, the trade balance was favourable.

TABLE 4 — *Romanian foreign trade in 1939 and 1940.*

| Year | Imports | | Exports | | Balance |
|---|---|---|---|---|---|
| | Quantity in tons | Value in thousands of lei | Quantity in tons | Value in thousands of lei | Value in thousands of lei |
| 1940 | 522,035 | 27,410,762 | 5,374,414 | 36,783,392 | 9,372,630 |
| 1939 | 739,040 | 22,890,474 | 7,564,146 | 26,809,349 | 3,918,875 |
| Difference | 217,005 | 4,520,288 | — 2,189,732 | + 9 974,043 | + 5,453,755 |

The favourable trade balance in 1940 amounted to 9,372,630 lei, *i. e.* 5, 453,755 lei greater than that registered in the previous year

Petroleum products and cereals, which together totalled 30,000 million lei, formed the basis of exports

TABLE 5. — *The evolution of exports from Romania of the principal products during the period 1938-40.*

| Exports | 1938 | | 1939 | | 1940 | |
|---|---|---|---|---|---|---|
| | Quantity in tons | Value in thousands of lei | Quantity in tons | Value in thousands of lei | Quantity in tons | Value in thousands of lei |
| Petroleum products | 4,496,520 | 9,313,224 | 4,178,100 | 11,226,564 | 3,528,756 | 23,091,900 |
| Timber | 967,188 | 2,456,376 | 859,632 | 2,529,876 | 366,216 | 1,822,572 |
| Cereals | 1,384,812 | 5,257,860 | 1,973,832 | 7,209,804 | 1,149,684 | 6,726,864 |
| Livestock | 58,992 | 1,220,868 | 77,472 | 1,800,156 | 28,428 | 983,400 |

It will be seen from the above table that the exports of petroleum products displayed considerable stability during this period, while those of cereals declined. As regards livestock exports, cattle values were steady, while no pigs were exported at all during the last few months.

*Regulation of foreign trade.* — Foreign trade was regulated by "Decree No. 668 of March 2,1940, concerning the establishment of exchange with foreign countries", which contains the following chapters (1) regulation of exports; (2) regulation of imports; (3) regulation of payments; (4) currency operations; (5) control of import and export prices and, lastly, (6) penalties.

No goods may be exported without a license from the Ministry of Foreign Trade. Said license is valid for 30 days as from the date of its issue; it is strictly personal, and not negotiable. The Ministry of Foreign Trade—wich has now become a mere Division of the Ministry of National Economy—must keep lists of all licenses granted, the National Bank supervising the entry of currency.

Imports of goods are also subject to permits with a validity of three months as from the day of issue.

On the money market the freedom of exchange has been abolished and in the case of some currencies the rate of exchange has once more been officially fixed. In order to encourage the influx of free currencies a supplementary 5 per cent. has been added to the existing free exchange bonus of 38 per cent.

The control of prices and values of goods exported is effected by the Ministry for Foreign Trade and the local commissions simultaneously with the granting of the export or import of licences

*Treaties and agreements.* -- During 1940 Romania concluded the following treaties and agreements

(1) Payment agreements between Germany and Romania in December, 1940,

(2) Agreements concerning the extension of the German-Romanian Payment agreements to the Protectorate of Bohemia and Moravia in December, 1940,

(3) Protocol concerning the regulation of payments between Romania and the Netherlands, December, 1940,

(4) Protocol concerning the regulation of payments between Romania and Belgium, December, 1940,

(5) Protocol concerning the regulation of payments between Romania and Norway, December, 1940,

(6) Protocol concerning the regulation of payments between Romania and the General Government (Poland), December, 1940,

(7) Payment agreement between Romania and Bulgaria, February, 1940,

(8) Payment agreement between Romania and Denmark, December, 1940;

(9) Payment agreements between Romania and Finland, December, 1940,

(10) Payment agreement between Romania and Italy, August, 1940;

(11) Transfer agreement between Romania and Switzerland, July, 1940;

(12) Payment agreement between Romania and Turkey, October, 1940,

(13) Trade arrangement and payment agreement between Romania and Yugoslavia, December, 1940;

(14) Trade arrangement and regulation of payments between Romania and the Netherlands, Belgium, Norway and the General Government, applicable to credits resulting from contracts concluded prior to April 1, 1941, signed on February 19, 1941.

## Measures relating to the marketing of agricultural products in the country.

*Fixation of prices of agricultural products.* — Owing to the exceptional conditions prevailing in Romania, the prices of numerous products show a tendency to increase. The Romanian Government has therefore taken all the necessary steps to prevent a disorderly rise in prices and speculation in articles of prime necessity and also with a view to adjusting as far as possible the prices of agricultural products to those of other products.

The *price of wheat* was fixed at 60,000 lei in August, 1940; as the harvest was poor a bonus of 8,000 lei was added, so that the price of wheat amounted to 68,000 lei per 10,000 kg. truck. The decree - law No. 3293 concerning the "price of wheat and flour", brought up to 25,000 lei per truck the poor crop bonus which brought the price of wheat up to 85,000 lei per 10,000 kg. truck, delivered free at the producing station, for wheat weighing 75 kg. per hectolitre and containing 3 per cent. of foreign matter. The price is raised or lowered in a given proportion for every kilogram more or less and for any difference in percentage of foreign matter. The amount of flour extracted must correspond to the weight in hectolitres increased by 8 per cent. The amount extracted must contain 8 per cent. of pastry flour and semo-

lina and 92 per cent. of common flour. The price of ordinary flour is fixed for bakers in Bucharest at 13.50 lei per kg., that of pastry flour at 27.50 per kg. In October, 1940, a ministerial order raised the price of common flour to 16 lei per kg. and that of pastry flour to 32 lei per kg.

A maximum price for *potatoes* was fixed only in the departments producing large quantities for sale. These prices were as follows:

Department of Braşov: 4.30 lei per kg. for potatoes of the "Săpunari" varieties and 3.60 lei per kg. for ordinary potatoes.

Departments of Făgăras and Târnava Mare: 4.10 lei per kg. for the "Săpunari" varieties and 3 60 lei per kg. for ordinary potatoes.

Departments of Suceava and Rădăutzi: 3.50 lei per kg. for the "Săpunari" varieties and 3 lei per kg. for ordinary potatoes.

Throughout the rest of the country potatoes will be sold on a basis of maximum local prices plus transport costs and a fair profit.

The *price of maize* "dinte de cal" quality, with a 16 per cent. moisture content and 3 per cent. of the grains damaged by insects is 52,000 lei per 10,000 kg truck.

For the "Pignoletto" and "Cincantin" varieties, 15 per cent. is added to the above price and only 10 per cent for the "Hângănesc" variety.

This price is raised or lowered by 1 per cent. for every single per cent. of moisture content (the same percentage holds good for damaged grains).

The *price of barley* weighing 58 kg per hectolitre and with a 4 per cent. content of foreign matter is fixed at 50,000 lei per 10,000 kg. truck.

The *price of oats* weighing 40 kg. per hectolitre and with a 4 per cent. content of foreign matter is 52,000 lei per 10,000 kg. truck.

For *rye* weighing 68 kg. per hectolitre and with a 3 per cent content of foreign matter the price is 70,000 lei per 10,000 kg truck.

In addition, maximum prices have been fixed for *milk, Braïla cheese, butter, other fats, meat and sundry other products.*

*Cession to the Government of cereal reserves from the 1940 harvest.* — Under date of May 24, 1941, all quantities of wheat, rye, barley and ordinary flour remaining over from the 1940 harvest and from the harvest of the previous years, have become the property of the State. The producer is left only 20 kg. of wheat (or rye) and ordinary flour for every person living with the producer of these cereals.

The following prices are paid for the quantities which have become State property:

(*a*) 117,000 lei per 10,000 kg. truck of wheat weighing 75 kg. per hectolitre and containing 3 per cent. of foreign matter, delivered at the producer's station or quay;

(*b*) 87,000 lei per 10,000 kg. truck of rye weighing 68 kg. per hectolitre and containing 3 per cent. of foreign matter, delivered at the producer's station or quay.

(*c*) 140,000 lei per 10,000 kg. truck of ordinary flour;

(*d*) 69,000 lei per 10,000 kg. truck of barley weighing 58 kg. per hectolitre and containing 4 per cent. of foreign matter.

All quantities of maize were blocked at the same time, with the exception of quantities destined for export. The price of maize with a moisture content of 16 per cent. was fixed at 72,000 lei per 10,000 kg. truck.

*Control of the market.* — In order to avoid the hoarding of commodities by merchants and to prevent speculation in products, the Government issued "decree-law nº 3674/940 for the suppression of *sabotage*". The purpose of this law is to combat commercial, industrial and financial sabotage.

Anyone attempting to put obstacles in the way of the supply and circulation of commodities and the publication of the prices established by the authorities, commits the crime of commercial sabotage.

Anyone attempting to damage the productive capacity of industrial plants and hinder the sale of products, commits the crime of industrial sabotage.

The creation of abnormal conditions on the financial market is considered as constituting the crime of financial sabotage.

Crimes of sabotage are punishable with from 5 to 25 years hard labour and the confiscation of the merchandise (or foodstuffs, products of money).

## Agricultural production policy.

*General measures.* — Wheat, rye and barley were sown during the autumn of 1940 on the basis of a detailed plan prepared by administrative divisions. The areas sown were as follows: 2,250,000 hectares of wheat (out of 2,300,000 hectares), or, in other words, 97 per cent. of the total and 52,000 hectares of winter barley (out of 60,000 hectares, *i. e.* 87 per cent of the total).

It was decided to set aside larger areas for oleagineous plants. Consequently, 360,000 hectares were reserved for sunflowers, and this programme has been carried out The area set aside for cotton which amounted to 18,000 hectares, has been increased by 60,000 hectares; 45,000 hectares will be sown to hemp, representing an increase of 13,500 hectares over the 1940 area, 30,000 hectares will be sown to flax, showing an increase of 17,500 hectares over the 1940 area; lastly, 56,500 hectares will be sown to sugar-beet, thus covering home consumption.

As regards animal husbandry, the number of head of livestock has been seriously reduced owing to uncontrolled consumption of meat and to loss of territory. An attempt has been made to improve the situation by taking steps to reduce the slaughtering of large cattle, the number of days when meat may be eaten has been reduced. On the other hand, it is now forbidden to slaughter animals under two years, except in the case of lambs and poultry.

The "decree-law No. 624/941 relating to agricultural mobilization", had for its object to secure the carrying-out of the crop plan in full. This decree-law authorizes the Ministries of Agriculture, National Defence and Co-ordination to adopt measures for the "organization of agriculture in the present emergency". These must include a crop plan relating to regions and to the country as a whole, as well as a plan for the supply of seeds, machinery and implements. The mobilization of the staff of the Ministry of Agriculture for field work and the requisition of livestock, vehicles and agricultural implements are also provided for.

*Land improvement.* — Work is in progress at the present time for the improvement of the land situated in the valley of the Jijia (Departments of Botoschani, Dorchoï, Jassy and Falciu). The work in course includes drainage, irrigation, regulation of streams, consolidation of slopes, filling in of ponds, etc.

## Land system.

*Agrarian reform.* — The Romanian Government decided (Decree-law No. 3,347/940) that rural holdings owned by Jews were to become the property of the State. Under the terms of this decree-law, Jews may under no condition whatsoever own or purchase rural holdings in Romania.

Rural holdings are understood to be: arable land, pasturage, unproductive land lakes, ponds, vineyards, country houses, parks, meadows, nurseries, lands used for breeding animals or poultry, apiaries and buildings of every description. Animals machinery and implements also become State property.

Exceptions have been made for: property strictly necessary for the operation of Jewish industries; land surrounding rural dwellings up to a limit of 2,000 square metres, gardens attached to urban buildings, furniture and domestic utensils, cereals and fodder purchased for sale.

The owners of the above property receive compensation from the State in the form of interest-bearing securities

In the case of real estate, compensation is assessed on the basis of the gross fiscal assessment, in the case of personal property, on the basis of current prices.

Property which passes in the hands of the State is placed at the disposal of the Under-Secretariat of State for Settlement and the evacuated Population; persons of Romanian origin coming from ceded territory are installed on these lands.

*Settlement* — As a result of the changes in Romanian territory, large numbers of farmers have taken refuge in the interior of the country, especially those who have fled from Bessarabia, Northern Bukovina, Northern Transylvania and Southern Dobrudja.

The great majority of refugees and repatriated subjects who lived by farming, have been settled in the interior of the country either on the lands freed by the evacuation of the people of Bulgarian origin to Southern Dobrudja, or on the lands which have become State property as a result of the expropriation of the Jews; or, finally, on the land freed by the repatriation of the Germans belonging to Southern Bukovina and Northern Dobrudja.

## Work of public and private agricultural organizations.

The Government placed a fund of 300 million lei at the disposal of the National Co-operative Institute for supplying farmers with seeds during the spring of 1940; 450 million lei were appropriated for the same purpose in the autumn of 1940 and 400 million lei in the spring of 1941.

The National Co-operative Institute purchases the seeds which are immediately distributed among the farmers through the Chambers of Agriculture.

The Government has also decided that the National Co-operative Institute shall import agricultural machinery for a value of 1,500 million lei. Most of these machines, especially the tractors, have already arrived and were distributed to the federal co-operative associations and landowners during the spring.

## Agricultural labour.

The number of agricultural labourers decreased during the past year on account of mobilization.

In order to prevent difficulties, the Ministry of Agriculture arranged that the Chambers of Agriculture should fix minimum rates for wages for every form of labour as well as for rents. Generally speaking, wages are obviously rising. The shortage of Manilla hemp will inevitably lead to a considerable rise in the cost of harvesting this year.

(Concluded on May 31, 1941).

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# BIBLIOGRAPHY ON ECONOMIC AND SOCIOLOGICAL SUBJECTS

BATTISTELLA Giacomo: Il credito agrario e fondiario in Africa. Vol. I: Ordinamento e sviluppo. - pp. 8-628; Vol. II: Testi legislativi. - pp. 1264. Tripoli, Cassa di Risparmio della Libia, 1941 (on sale only at the Libreria Cremonese, Rome).

Agricultural credit takes on a peculiar character in the colonies, and particularly, in Africa, where it is often necessary to exploit desert land or regions covered with luxuriant wild vegetation, where climatic conditions are often extremely unhealthy, where natural visitations are frequent, where in most cases there exists no legally recognized land system and, lastly, where the land is inhabited by primitive peoples absolutely devoid of any sense of social responsibility. The credit systems in force in the mother-country obviously cannot be applied under such conditions and have to be adjusted to suit the particular local requirements as well as the objectives aimed at by colonization and, wherever the progress of the native population makes it possible, the credit policy adopted must be adapted to their particular mentality this is because more elastic forms of financial aid are better suited to the native mind than the rigid principles which govern the maturity and guarantee of loans in the mother country.

The agricultural and land credit institutions and special services in the African colonies must take into consideration the difficulties inherent to local conditions, as well as the special risks such as flood, windstorms and the typical epidemic diseases to which both man and beast are liable, which at a single blow may destroy the results obtained from the work of organization and production over a long period of years

To Giacomo Battistella, who has been president ever since its foundation of the Savings Bank of Libya, one of the most flourishing banking institutions in Africa, is due the initiative which led to the compilation, in collaboration with Dr G Perris, of a book which embraces a wide field. He has made use of an extensive range of documents classified scientifically in such a way as to throw light on the various agricultural systems created in the principal African countries.

The work under review embraces the whole African continent and makes a complete study of the organization and evolution of agricultural credit from the outset down to 1940. Many African colonies have no agricultural credit institutions even today; others, instead, more important and economically more progressive, already possess agricultural credit facilities Each of these colonies forms the object of an extensive study An idea of the importance of this work may be obtained from a list of the countries whose colonial possessions are dealt with, namely: *Italy*, including Libya (Tripolitania and Cyrenaica), Eritrea, Italian Somaliland; *France* French Equatorial Africa, French West Africa, the Ivory Coast (Dahomey, French Guinea, Mauretania, Nigeria, Senegal, French Sudan), Algeria, the Cameroons, Madagascar, Morocco, Togoland, Tunisia, *Great Britain*: Kenya, Southern Rhodesia, the Union of South Africa, South-West Africa; *Belgium*: Belgian Congo and Ruanda Urundi, *Egypt*.

The work consists of two volumes The first begins with a general introduction containing a comprehensive outline of the problem, after which the Author proceeds to make a comparative study of the various measures taken, grouping them systematically. In this way it is shown that government intervention tends in the colonies towards the creation of fundamental conditions for the development and consolidation of agriculture, or towards the introduction of technical and economic measures, towards providing the regions to be colonized with the organization essential to the attainment of this purpose, or else to the organization of the collection and marketing of products. In the form of concise monographs, the Author reviews the juridical organization and the development of the various agricultural credit institutions; he completes his review with numerous statistics concerning the results obtained. This part of the work is preceded by some general considerations intended to give an idea of the environment in which the credit institutions carry on their work and by a list of all the legislative measures adopted in each colony in the field of agricultural credit, classified under a system as uniform as possible for the different countries.

A study is also made of the numerous measures taken in the colonies in order to facilitate the adjustment of agricultural indebtedness.

The second volume contains, in the original language, the text of the laws concerning agricultural credit promulgated in the countries considered in the first volume,

from the beginning of the organization down to June, 1940. In this way the Author enables the reader to follow the entire evolution of the agricultural credit system now existing in each colony on the basis of the texts of the laws quoted *in extenso* and including all those subsequently abrogated or amended. As the Author has obtained his material from original sources the documentation is first-hand. The consultation of the laws is facilitated by their arrangement in chronological order and by countries; there is also an abundance of notes and cross-references, mention is made of amendments and the indices are complete and detailed.

The volumes under review are a systematic reference work to be consulted not only by the students of the subject but also by those official spheres to whom the abundant documentary material will supply useful information as well as a stimulus to constructive action in this domain.].

G C.

ANDREOTTI, Aldo Il commercio della gomma elastica. Società editrice internazionale, Torino, 1940, 322 pp, con molti esempi di vari contratti tipo (trade in raw rubber) Price Lire 40.00 + 5 %.

This most instructive work gives a very clear description of the trade customs on the raw rubber market. In his introduction the Author discusses the countries producing raw rubber, the chemical composition and external characteristics of this product; this chapter is followed by a description of the part played in modern trade by this raw material as well of the prospects for future uses. The difference between rubber obtained from wild stock and plantation rubber and their various technical names are dealt with in full; then follows the description of the synthetic product from the standpoint of preparation and characteristics The part played by Italy and the part she may play in the production and manufacture of both natural and synthetic products is also dealt with. The introduction concludes with the figures for world output and consumption in the various countries The comparison of Italian imports of raw rubber and the profits gained from the transformation of this product, also discussed in this chapter, is extremely interesting

Then follows the main part of the book comprising 208 pages which discusses the characteristic features of the fluctuations of the raw rubber market (rubber obtained from wild stock, plantation rubber, synthetic rubber, recuperated rubber, Latex and its various trade types) as well as the financing which stimulates or hampers output There is an accurate description of the organization of the market and the customs in use on the Far Eastern markets (Singapore, Batavia, Colombo), together with those in use on the European markets, especially England and the Netherlands, and also in France, Belgium and Germany. Special mention is made of the Japanese and American markets. An important place is reserved for the technical aspects of the trade This part of the book begins by describing private trade and its regulation, including the determination of weight, defects, the fall in prices, the non-observance of contractual obligations solvency and its guarantees. It then deals with the sale of raw rubber by auction and the special regulations in this respect in force in London, Singapore, Antwerp, Colombo and Batavia. Next it discusses the technical aspects of trade in Latex, Revertex, etc., and afterwards with standard contracts and the clauses in general and in particular. The main part of the work closes with a description of the customs on the stock exchange including a special review of Italian trading customs. A special conclusion deals with the formation of prices for the raw product in the country of origin, which is of great importance for the progress of the market; in this connection the organization of the rubber market by the International Rubber Regulation Agreement, 1934, is treated

All the data are accompanied by extensive documentary evidence based on figures, forms of contract and other records. Taken as a whole, the book is a valuable contribution towards the study of the progress of the rubber market which has never before been described so fully].

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# MONTHLY BULLETIN
OF
# AGRICULTURAL ECONOMICS AND SOCIOLOGY


## FROM SYNDICATE TO CORPORATION IN FRENCH AGRICULTURE


by Prof. GAÉTAN PIROU



SUMMARY Introduction — I Structure and statutes of syndicates and agricultural associations prior to 1940. *Origin of syndicates and of co-operative organizations. Legal status of syndicates and co-operative organizations. Co-ordination of collective rural activity.* — II Signs of agricultural pre-corporativism prior to 1940· *Origins of corporative tendencies. Chambers of Agriculture. Mixed private and official bodies. Regulating powers of existing groupings* — III The Law of December 2nd, 1940, concerning the peasant corporation


### Introduction.

The law promulgated on December 2nd, 1940, granted a new statute to collective agricultural action in France. Under this law corporative organization was substituted for the old agricultural syndicates, voluntary, free and multiple in character, replacing them with a single, corporative syndicate, invested with the power to issue regulations and to which the rural co-operatives and specialized associations are compelled to adhere. This is indeed a marked change. It is nevertheless not so radical as might at first sight appear, since signs of an evolution leading from the syndicate to the corporation could be observed for the past fifteen years.

In order to obtain a clear idea of the ground covered it will be necessary, in the first part of the present article, to recall the essential features of collective agricultural action as it had developed under the laws promulgated in France at the end of the 19th century. The second part will deal with the principal stages of the evolution towards the corporation during the period up to 1940. In the third part a description will be given of the innovations brought to the above evolution by the law of December 2nd, 1940.

### I. — Structure and statutes of syndicates and agricultural associations prior to 1940.

#### Origin of syndicates and of co-operative organizations.

Collective agricultural action in France sometimes took the form of the *syndicate* and sometimes that of the *co-operative association*.

The *syndical* form was practised chiefly by the groups organized for collective *purchasing*, which undertook to supply their members with their require-

ments in fertilizers, seeds, ploughing implements and feeding stuffs for livestock. The agricultural syndicates commenced this type of work at the end of the 19th century. At first they made purchases of chemical fertilizers as a means of opposing the unscrupulous practices of tradesmen who were selling inferior products at high prices. The saving which resulted from this plan was considerable (between 30 and 40 per cent.) Encouraged by their success the agricultural syndicates installed experimental laboratories and called regularly upon the advice of qualified agricultural experts, all for the purpose of discovering which fertilizers were best suited to the various types of soil and crop.

The agricultural *co-operative associations* dealt mostly with the *transformation* and *sale* of the products of the soil. The largest number of these organizations consisted of *co-operative dairies*, which sprang up first in the Charentes area in 1888, when the outbreak of phylloxera, which ruined the vineyards, obliged the peasants to transform their ground into pasturage. Here again, the abuses of capitalist dairies induced the peasants to form themselves into groups which undertook the transformation of milk into butter in order to escape from the exploitation which was ruining them. The co-operative dairies of the Charentes and Poitou districts employ the latest industrial dairying methods. Through combined action, they launched caseine factories and pig farms by which the by-products of butter-making are utilized. In a report issued in 1937 by the *Conseil National Economique* the number of co-operative dairies and butter factories was estimated at 459. Co-operation for processing had also made a certain amount of progress in the field of *winemaking* in the Languedoc region. In 1937, the number of co-operative cellars was estimated at over 700, in which some 100,000 vine-growers were grouped, these cellars handled about 20 per cent. of the total amount of wine produced in France. As regards the *sale* of agricultural products, co-operation had been applied to a certain extent in the field of *fruit* and *vegetables*. It was practically unknown among wheat-growers until 1930 at which date there were only about ten co-operatives handling the sale of wheat. Conditions changed quickly immediately after that, for by 1937 there were over 1,200 co-operative associations of wheat-growers which handled the marketing of over 4/5 of the whole wheat crop of the 1936-1937 season. It is a fact, however, that this development was not spontaneous, it was the result of regulations imposed by the authorities on the cereal market, granting an almost complete monopoly to the co-operatives as middlemen between the producers and the mills. These co-operatives were in fact an administrative and official organization and their constitution and management were subject to very close government control.

## Legal status of syndicates and co-operative organizations.

As to the legal status of these syndicates and co-operative agricultural associations, whatever their form, these peasant organizations were free and optional in principle, as were the industrial and trade syndicates and co-operative associations. Except in the case of the wheat co-operatives, whose particular constitution has just been mentioned, the syndicates and co-operatives had no *official*

*standing*. Anyone who liked could join. Only those who agreed of their own free will were bound by the decisions of the group.

Moreover, the legal limits of the power of the agricultural groupings were different in the case of syndicates, on the one hand, and of co-operative associations, on the other hand.

(1) The syndicates came within the scope of the law of March 21, 1884. It is a well-known fact that the men who drafted this law were not contemplating agriculture at all and that the law was extended to the countryside following an incident which took place at a meeting of the Senate when the bill was under discussion. Indeed, agricultural syndicates very soon assumed a peculiar aspect. They had practically no resemblance to the industrial and trade syndicates of owners and workers, which were *class* organizations, setting the representatives of capital in opposition to the representatives of labour. The agricultural syndicate, on the other hand, comprised owner-farmers, non-operating owners, tenants and share-croppers. Their aim was to protect the material and moral interests of agriculture. In reality, these groups had been moulded in a form which had not been intended for them and which was in no way suited to the role, *economic* rather than *social*, which they had to play. This anomaly became evident in 1907 when several court decisions prohibited agricultural syndicates from purchasing, for resale to their members, articles necessary for their maintenance and for the exercise of their occupation. There was some talk then- and it would certainly have been the best solution- of passing a special law giving the syndicates the necessary powers for carrying on the work for which they had, as a rule, been created. Finally, these powers were granted partially in 1920 under the terms of the law bringing the statute of syndicates up to date. Article 16 of the law obviously contemplates the case of agricultural syndicates. It allows them to purchase for rent, loan or distribution among their members, the articles necessary for the exercise of their occupation. But it subordinates this legal permission to very strict conditions, since it does not allow them, in the course of these operations, to make any profit, "even in the form of a bonus to members". The syndicates were thus much more severely hampered than the co-operative associations. Consequently, immediately after the passing of the law of 1920, some of the agricultural syndicates, as a side line to their usual services, created co-operative associations to which they transferred their operations connected with purchase and resale, all of which they had been carrying on up to that time under conditions whose legality was obviously doubtful.

(2) As regards agricultural co-operative associations, these continued for a long time without a statute of their own. It was admitted that they could place themselves either under the regime of *civil* companies, such as those contemplated in article 1832 and seq. of the Civil Code (this was done by most of the co-operative dairies), or else they could assume the form of companies *with variable capital* as instituted under a law of July 27, 1867; since they were commercial in form, they came within the jurisdiction of commercial courts and in cases where business was bad, could be declared bankrupt. But, whether civil or commercial, if they wished to enjoy the benefits granted by the authorities (credit facilities, exemption from taxation) the agricultural co-operative assoc-

iations were obliged to comply with certain definite conditions contained in a series of laws and decrees issued during the period between 1920 and 1939. In an article published in the International Review of Agriculture in 1939 (page 407 E and seq.), Mlle M. Apchié analyses these laws in detail. It will suffice in this place to make brief mention of their essential provisions. The co-operative associations must be strictly *vocational* in character; their members must be exclusively farmers. They must constitute a group of persons united by a *stable* bond. This is the reason why their capital must consist of personal members' contributions and not of negotiable shares. These personal shares in the capital are not transferable unless with the permission of the association. Anyone who agrees to form part of a co-operative association is obliged to use its services in any operation within the scope of the activity of the association and he may only withdraw from membership under certain conditions. The co-operative associations must share their profits on the co-operative and not on the capitalistic principle. Moreover the members' shares are not entitled to dividends but only to a *fixed interest* (maximum 5 per cent.). Profits are distributed among the members in proportion to the operations transacted by them with the group (for instance, in a dairy they are distributed in proportion to the amount of milk brought in by each member). The association must manage its affairs on a *democratic* basis. In order to prevent its strong and rich members from gaining the upper hand, the number of votes to which each member is entitled is based *on the interest of the members as a whole*, and not on the particular interests of those who are in control of its administration. Consequently, the functions of members of the managing board are on principle exercised *without remuneration*. Lastly in order to prevent the co-operative association from becoming an ordinary trading concern, it is only allowed to purchase goods necessary for the *farming operations* of the members and to sell only their products.

**Co-ordination of collective rural activity.**

Between the 15,000 or so agricultural syndicates and the 8,000 or so agricultural co-operative associations existing in France in 1939, certain bonds had been created which helped to co-ordinate collective rural action and considerably increased its efficiency.

On the one hand there was a certain number of unions of co-operative societies which, without being legally recognized, had been operating for a long time. They were recognized by the decree-law dated August 8, 1935, which subsequently, on August 26, 1936, became law. These unions played an important part in the education of the peasants concerning the standardization of products, the improvement of packing methods, the adoption of collective trade marks, etc.

On the other hand, the agricultural syndicates were federated on a regional basis, and several of these federations had assumed imposing proportions. There was the South-East Union, for instance, uniting some 8,000 organizations in 15 departments and representing more than 200,000 peasant families. These organizations did not consist exclusively of agricultural syndicates. They also

included co-operative associations and mutual societies for insurance against risks (fire, accident, hail, mortality among the livestock, etc.). But it was the syndicates which, within the limits of the regional federations, played the principal part, and the leaders of collective agricultural action considered the syndicate to a certain extent as the mother-cell around which other peasant associations must naturally congregate.

Lastly, during the past twenty years an increase has taken place in the number of specialized federations, namely of these groups which unite farmers producing a given product (the association of wheat-growers, the confederation of vine-growers, the milk confederation, the confederation of beet-growers). This must be regarded as a consequence of the fact that each important agricultural product brings up its own economic problems and has therefore caused the public authorities to intervene with special legislative measures. By grouping themselves into categories according to products, farmers were therefore in a better position to defend their interests.

At the head of collective agricultural organization were the confederations, whose aim was to unite all agricultural producers throughout the whole of France. It had never, however, proved possible to attain unity on this plane. The *Société des Agriculteurs de France*, founded in 1868, with its conservative outlook and its leanings towards paternal interference, was in opposition to the *Société Nationale d'Encouragement à l'Agriculture*, founded on the initiative of Gambetta in 1880. The *Confédération Nationale des Associations Agricoles*, of much more recent date (1919), was formed with the chief object of co-ordinating the activities of the various federations specializing in certain products and had, moreover, practically ceased to operate after 1936.

It will be seen that the agricultural groupings existing in 1939 were of real importance and proved that the modern trend towards collective action had succeeded in overcoming the resistance opposed for so long by peasant individualism. Nevertheless, being a purely spontaneous and completely untrammelled creation, it became a heterogeneous mixture whose main fault lay in excessive diversity of organization. Unity was lacking both at the base (since syndicalism and co-operation frequently embraced only a minority of the farmers, and in any case never represented the class as a whole) and at the top (since federations and confederations with opposing ideas and tendencies prevented French agriculture from attaining the cohesion and power which it would have received had the management been combined under a single head).

## II. — Signs of agricultural pre-corporativism prior to 1940.

### Origins of corporative tendencies.

Those who favoured corporativism had become convinced that free and voluntary groups which represented only a part of those interested and which were not entitled to speak for all, were quite powerless to organize the farmers as an occupational group, and in rural circles their theory had met with considerable support. Nevertheless it was not as a rule thought possible to create an agri-

cultural corporation straight away, simply by substituting it for the co-operative organizations and syndicates. As a matter of fact, the tendency was rather to seek intermediate solutions by continuing to act through the existing forms of collective agricultural action and gradually converting them into an organization of more or less corporative type.

Three solutions were put into effect simultaneously with this end in view, all three of which were fragmentary and limited in scope; they were, however, none the less interesting as symptoms revealing the underlying transformation taking place in ideas and facts.

**Chambers of Agriculture.**

The first solution consisted in adding to the syndicates and co-operative associations a sort of official bodies, quite distinct from these organizations, but on which these organizations were represented. This was achieved by the creation of Chambers of Agriculture after half-a-century of parliamentary debate. These institutions started their work in 1929 The most original feature of the Chambers of Agriculture consisted in the composition of their electoral body which rested on both individual and collective representation It comprised: 1) all Frenchmen interested in agriculture whether as owners, tenants or wage earners; 2) all agricultural groups, whatever their juridical form (syndicates, co-operative associations, mutual benefit societies, etc.). As a matter of fact, one fifth of the electoral body consisted of these groups and four-fifths of individuals. But the part played by electors in the voting was very different in each of these two cases. Only about 50 per cent. of the individuals entitled to vote presented themselves at the urns, while of the collective electorate 80 per cent. were represented at elections. The Chambers of Agriculture claimed that they had succeeded in achieving a real representation of agricultural interests as a whole. They did not confine themselves to giving information and advice and to submitting petitions to the authorities. They had been called to co-ordinate and codify local custom and usage, and this task was almost completed in 1939. They appointed representatives of rural interests on the National Economic Council, on the central board of the *Office du Blé*, etc. They were entitled to collect taxes which amounted to some 10 million francs annually (or, on an average, about 100,000 francs for each Chamber). They also received 9 per cent. of the profits from the domanial potash mines (which brought in about 40,000 francs to each Chamber). The presidents of the departmental Chambers had acquired the habit of calling an Assembly to co-ordinate their work. This Assembly, which was originally quite unofficial, acquired an official character in 1935. It became a public institution with civil status.

**Mixed private and official bodies.**

A second solution took the form of the creation of semi-private, semi-governmental bodies, consisting of delegates of the private organizations along with members appointed by the Government. This solution was applied in

the highly specialized field of vine-growing in the Champagne region. The author of a work ([1]) on the organization of vine-growing in the Champagne country actually gave the following sub-tible to his book: « *Des syndicats vers la corporation* ». We are therefore here confronted with a tendency of a general character.

In the Champagne country the vine-growers were grouped into well constituted syndicates. The traders in Champagne wines, for their part, also had their own syndical organization. Vine-growers and traders had, from certain standpoints, opposing interests, since the former wished to sell their crop at a high price, while the latter wished to buy cheap. But in other respects both parties had interests in common. They were equally interested, for instance, in the suppression of fraud and the recognition of the registered trade names. On these grounds a corporative organization of viticulture founded the *Commission des vins de Champagne* in 1935. This Commission consisted of: 1) delegates from the vine-growers' syndicates; 2) delegates from the traders' syndicates; 3) delegates from the Chambers of Agriculture in the departments concerned, members of Parliament and officials. The Commission was authorized to study and deal with all problems relating to production and prices. It is generally admitted that its action was efficacious in the matter of controlling output and maintaining the traditional reputation for high quality enjoyed by champagne. It should be stated here that prices are fixed each year 8 days before the harvest by a sub-commission consisting solely of members representing the interests concerned, members of Parliament and general councillors belonging to the region having been deliberately excluded in order to prevent electioneering influences from causing the normal price to be replaced by a political price.

The *Office du Blé*, which operated from 1936 to 1940, may be considered, although in a much wider field, as a body which associates delegates appointed by producers and delegates appointed by the Government for the purpose of controlling the market. The Central Board of the *Office du Blé*, which was the body authorized to take essential decisions, consisted of a majority of representatives of producers (30 out of 52), these being appointed either by the Assembly of the Presidents of the Chambers of Agriculture, or by the wheat co-operative associations. But as regards the most important point, *i. e.* the fixing of wheat prices, the board's decision was valid only when carried by a majority of 3/4 of the votes and if 4/5 of the members of the board were present. If these conditions were not fulfilled, the decision lay with the Government. This is what happened in 1937. It should be mentioned that this is one of the difficulties encountered in the practical realization of corporativism: the central board of the *Office* had 9 members representing consumers, but since the consumers were not organized, it was no easy matter to decide how these representatives were to be appointed. The law of August 15, 1936, solved the problem in a manner which strikes as undoubtedly curious: three out of the nine members were chosen by the *Fédération Nationale des Coopératives de Consom-*

([1]) Cf. PIARD, P.: *L'organisation de la Champagne viticole*. Paris, 1937.

*mation*, three by the *Confédération Générale du Travail*, one by the French Confederation of Christian Workers, one by the Associations of large families and the last by the Confederation of Craftsmen.

The law of November 17, 1940, which substituted the *Office des Céréales* for the *Office du Blé*, not only gave the *Office* more extensive powers by authorizing it to handle the so-called secondary cereals, but also accentuated the powers of the Government, which will in future choose « from among the occupational organizations » the members of the Managing Committee (which now replaces the former central board), the Government will also fix all cereal prices until further notice.

**Regulating powers of existing groupings.**

A last solution allows existing groups, in spite of their voluntary and private character, to issue regulations under certain conditions which allow these groups to be considered as really representative of the parties concerned. The bill submitted at the beginning of 1935 concerning compulsory industrial agreements was based on this idea; this bill was voted by the Chamber of Deputies, only to be shelved by the Senate, but was later revived in decree-laws and other laws concerning certain industries, such as the manufacture of sugar and shoes. The law of June 24, 1936, concerning collective labour agreements, embodies the same tendency since it makes it possible to extend a collective agreement to a whole occupational group or a wohle region under a ministerial decree. It is therefore not surprising that, in the case of agriculture, it was also decided to convert all the collective agreements concluded between groups of farmers and groups of processors of the products or of traders into a comprehensive system, by compelling all the producers of a region to adhere to the method. A certain number of types of agreement were realized in practice: for instance, the agreements between the growers of beet and manufacturers of sugar, or between the producers and collectors of milk. The bill introduced in November, 1936, by the Minister of Agriculture concerning collective agreements for the sale of agricultural products, granted the Minister very wide powers with a view to extending the agreements to farmers, processors, and traders as a whole in a given region. The Chamber of Deputies admitted that this extension might be granted subject to the presentation of proof that the agreement had been approved by 2/3 of the interested parties, representing a minimum of one half of the production in question. This was something similar, allowing for differences in percentages, to the system practised in England since 1931 under the name of marketing schemes, England having borrowed the idea from Australia and South Africa.

The French Senate, which had refused to pass the draft of the general law concerning compulsory industrial agreements, also rejected the bill on collective agreements for the sale of agricultural products, which consequently did not become law. It was, however, deserving of mention here since it was one of the several signs of the tendency towards a corporative organization of agriculture. This tendency was to blossom into the law of December 2nd, 1940, which will be discussed below.

## III. — The Law of December 2nd, 1940, concerning the peasant corporation.

The new French legislation is based essentially on two principles: 1) from the existing forms of collective agricultural action it chooses the syndicate, to which definite preference is given, since all other agricultural groups are more or less completely subordinated to it; 2) the syndicate, however, now assumes a corporative character, which means that *a*) it will be the only one (syndical plurality being therefore abolished); *b*) it will be authorized to issue regulations (consequently, its former character as a purely private group speaking in the name of its members only, now disappears). There was however no desire to render the corporative agricultural syndicate compulsory. Farmers are invited to join. They are not compelled to do so. But whether or not they belong to the syndicate, they have to submit to its decisions and are bound by the agreements it concludes. These new features make the new type of corporative syndicate radically different in its nature and its sphere of action from the former groupings.

The corporative syndical organizations may be considered as a three-storeyed building. On the ground floor, the local syndicate, over which is the Regional Union; at the top the National Council. In order to be prepared for the possibility of a reform in France's administrative organization, it has been specified that the local syndicate may cover either a single commune or a group of communes. The same holds good as regards the regional union which may be extended to a whole department or to a group of departments.

On each storey of the building, the persons entrusted with the direction of business are not elected by the members of the syndicate on the same storey, but are appointed by the group belonging to the storey above. Thus, the local syndicate is under the presidency of a " syndic" appointed by the Regional Union. The president of the Regional Union is chosen by the Minister of Agriculture.

Very ingenious arrangements have been made in order to ensure that the following organizations will be subject to the syndical corporative organization : 1) the co-operative associations; 2) the associations specializing in certain categories of products (wheat, wine, milk, beets). No one who is not already a member of a corporative syndicate may join an agricultural co-operative association. All the co-operative associations dealing with the same particular product must form a single occupational organization, two-fifths of the managing board of which must consist of members appointed by the syndicates and not by the co-operative associations. Similarly, the specialized associations are formed by delegates appointed by the corporative syndical organization.

The Chambers of Agriculture have been abolished. It has been provided that they are to be replaced by " Regional Chambers of Agriculture", whose members will no longer be elected, but will be appointed by the Minister; their function will be strictly limited to the study of the technical development of agriculture and to the creation of centres, stations and research laboratories likely to promote it.

The law of December 2nd, 1940, has only laid down the principles of organization. A special commission recently appointed, which has already commenced its labours, will propose all the measures aiming at the elaboration and the putting into effect of the new regime. It would be premature to express an opinion concerning this reform. It will suffice, for the moment, to define its spirit. The almost complete disappearance of election, the rôle assigned to the Government in appointing the persons directing the unions, the supervision of decisions and the right of veto granted to the Minister of Agriculture, all give a clear idea of the spirit of the new organization. To use present-day terminology, we will say that this represents State corporativism and not association in the sense that it is imposed and not spontaneous In any case, the same features are to be found in the law of August 16th, 1940, which created the *comités d'organisation* for industry in France They, too, have to a great extent taken the place formerly occupied by the syndicates, federations and confederations. They, too, have been charged with the task of regulating and controlling the occupational groups under the guidance, supervision and control of the Government, of the Ministers and of their commissioners (1).

## *INTERNATIONAL CHRONICLE OF AGRICULTURE*

### DENMARK

During the entire period following on September, 1939, Denmark's economic life, as indeed was the case throughout the rest of Europe, was strongly affected by the European war. The country's economic situation demands that remunerative markets be found for large quantities of agricultural products and that the raw material necessary to industry, which employs as many people as does agriculture, should be obtained with the proceeds of the export of agricultural products, these sums also make it possible to purchase fuel and other commodities for direct consumption, especially raw materials essential to agriculture—such as fodder, oilcakes, chemical fertilizers—since without these agricultural output cannot be maintained at the normal level

Only a very small number of these commodities was lacking to Danish trade during the first seven months of the war, considerable stocks had been laid in, and during the first few months of the war large quantities of merchandise were still able to reach the country in spite of the exchange situation and of the difficulties of transport. After April, 1940, when the blockade had seriously reduced international trade, agriculture was no longer able to obtain the usual quantities of cereals and fodders, while industry saw its supplies of fuel and raw materials considerably diminished. The difficulties encountered in maintaining industrial activity under these conditions made it necessary to institute State and communal subsidies for the creation of work and the reduction of unemployment.

(1) For a more detailed description, see GAÉTAN PIROU: *L'Agriculture. Le Commerce* (forming the third volume of *Traité d'Economie Politique* by G. Pirou and M. Byé, 1 volume to appear shortly. Published by Sirey).

The fear of an inflation, similar to that which took place in 1914-18, also drew the attention of the authorities to the price problem. During the early months of the war it was chiefly the rise in prices which took place in the belligerent countries and the increase in freight rates which led to a rise in the price level in Denmark; since April, 1940, when most of Denmark's foreign trade has been carried on with Germany, it has been sought to adjust the international value of the Danish crown so as to prevent the German price level from influencing the prices in Denmark and leading to a considerable rise in prices due to the low exchange rate of the crown. Such an adjustment of the crown has not, however, as yet been achieved. Recently, the abundance of cash resulting from the sale of stocks of merchandise and of live-stock has again aroused interest in the price problems. The wholesale price index rose from 111 in August, 1939 to 166 in March, 1940 and to 201 in May, 1941.

As regards agriculture, the difficulties encountered during the early months of the war were closely connected with the problem of obtaining high enough prices for the commodities shipped to England in order to support home production After April, 1940, when the greater part of agricultural exports have been exported to Germany, agriculture obtained higher prices, chiefly because the price of agricultural products was higher in Germany than in Denmark and because the cost of transport was not so heavy. The difficulties reappeared later. Denmark was unable to obtain enough wheat and fodder and, in part, chemical fertilizers, to maintain her output. It was therefore very unfortunate that, as a result of the extremely severe winter, the 1940 harvest was poor, the 1939 harvest had, on the other hand, been good. The economic result of the agricultural year 1939-40 was better than that of the previous year, in spite of the difficulties encountered the net return expressed as a percentage of total capital invested, as calculated by the ' Landøkonomisk Driftsbureau ", amounted to 3.9 as compared with 3.5, 3.6 and 1.9 in the three previous years It is estimated that agriculture obtained good cash receipts in 1940-41, but it must be recalled that a part of the cash receipts was obtained from the sale of cattle rendered necessary by the fodder shortage, these cash receipts do not therefore represent a profit on farming, but a reduction in the farmers' capital

## Foreign trade.

During the first seven months of hostilities, Denmark continued to trade with foreign countries as before, so that most of the chief export commodities—butter, bacon, eggs and meat—were still shipped to England; large quantities were also exported to Germany.

The maximum prices for butter, bacon, eggs, etc. which had been fixed in England immediately after the outbreak of war, were so low that the production of these commodities did no longer pay to the Danish farmer, the more so that the value of the pound sterling had fallen, while the cost of transport had increased. After protracted negotiations, some increases in price were successfully obtained in the autumn of 1939; the Government was, however, obliged to subsidize agriculture (see next chapter).

After long negotiations with England during the winter of 1939-40, a new Anglo-Danish convention, applicable as from April 1, 1940, was concluded. Under the terms of this convention, the quantities of Danish products directed towards England were to be considerably reduced. The German occupation which took place in April deprived this convention of any practical importance.

Trading was continued with Germany on a basis of the existing commercial and clearing agreement; under the terms of this agreement negotiations take place every

quarter determining the details and especially the alterations in quantities and prices. The cessation of exports to England created a temporary glut of agricultural commodities in the country; but these stocks were exported to Germany shortly afterwards. Ever since April, 1940, the great majority of Danish exports has constantly been directed towards Germany, although some shipments are also made to other countries, chiefly Norway, Sweden and Finland. Prices have been steadily rising. Thus the price of butter, which was about 250 Danish crowns per 100 kg. in March, 1940, rose to 276 crowns in April, 335 in July, 380 in September, 450 in October and to 500 crowns in January, 1941. A supplementary bonus of 25 crowns is paid on all exports exceeding a given quantity, so that the average price since January 1, 1941, has been 510 crowns. The price of other agricultural commodities has also increased, but in a much smaller proportion.

The majority of Danish imports came from Germany, especially fuel; iron and metals, raw materials for the textile industry, chemical products, fertilizers and quantities of petrol and oil also came from that country. During the summer and autumn commercial and clearing agreements were concluded with some countries. As conditions had altered, it became necessary, in spite of the conventions in force, for all international trade to be carried on on the basis of clearing agreements. The most important conventions were concluded with Sweden, Norway and Finland, later came those with Italy, Russia, Switzerland and several of the Balkan countries. Under the terms of these conventions, exports usually take the form of agricultural commodities and chiefly of pig meat, eggs, sugar, powdered and condensed milk, seeds and fish, while the list of imports includes commodities required for industry and chemical fertilizers for agriculture.

The total value of agricultural exports amounted to 1.107 million Danish crowns in 1940, compared with 1.148 in 1939; the increase was due in part to high prices and in part to the reduction in livestock. Denmark's total exports amounted to 1,507 million crowns (1939 = 1,578 million crowns) and total imports came to 1,374 million crowns (1939 = 1,740 million crowns).

## Policy relating to the marketing of agricultural products.

*State subsidies.* — As has already been stated, the early months of the war did not contribute to the prosperity of agriculture; moreover, the prices of raw materials imported for the needs of agriculture increased in much greater proportion than did those of the commodities exported. The reason for this is to be found in the fixing of maximum prices in England, in the increase in transport costs and in the payment of insurance premiums against war risks. It should be added that the Danish Government, rendered anxious by the steady fall in the value of the pound sterling, ceased to use it as the basis of the value of the Danish crown which was henceforth pegged to the dollar; consequently, in the autumn of 1939 Danish exporters only obtained 20.70 Danish crowns for a sterling, instead of 22.40 crowns.

This situation made it clear that another way must be found to compensate Danish agriculture. The law of November 16, 1939, introduced compensation measures intended to abolish the disproportion between the price of agricultural export products and agricultural expenses; the Government paid a bonus amounting to 6 per cent. of the export value of bacon, butter, powdered and condensed milk and eggs and a bonus of 2 crowns per 100 kg. of fodder imported. This law was repealed at the end of January, 1940, and substituted with the law of February 1, 1940, which maintained the bonus of 6 per cent. on the export value of butter and powdred or condensed milk; the

bonus on bacon and eggs was abolished. The law also increased the supplement on wheat freight, raising it to 6 crowns and introduced a bonus of 2 crowns per 100 kg. of Danish and imported oilcake. The supplement on fodder was paid only on a given quantity. This law, which expired on March 31, 1940 was replaced by the one promulgated on March 30, 1940, under the terms of which the Government paid a supplement amounting to three-quarters of the difference between the former rate of the pound, i. e. 22.40 Danish crowns and the actual rate, so that the price of butter came to 3 crowns per kg. more than the 1939 price, that of bacon to 2 crowns more, while that of eggs exceeded the 1939 price by 25 crowns per hundred These measures however, turned out to be of little practical value, because, as a result of the occupation, trade with England ceased a few days after the promulgation of the law. Measures embodied in the law concerning a supplement on freight rates for a given quantity of fodder imported, enacted for the purpose of helping the small farms, were also of restricted importance owing to the occupation, as the stocks of foreign wheat were reduced to a minimum and new supplies failed to arrive.

*Regulations concerning cereal supplies.* -- The measures affecting agriculture to a considerable extent were, in the first place, those whose purpose was to ensure supplies of wheat and other foodstuffs for the population; to these should be added the efforts made to ensure supplies of raw materials for industry and to establish the equitable distribution of wheat available for feeding livestock, so that the fodder supplies might suffice for the country's requirements and leave a considerable margin for export.

Some restrictions on rye and wheat imports were already in force prior to the war; they were intended to secure adequate prices for Danish wheat growers. On the outbreak of war, when it became necessary, as far as possible, to increase imports, these restrictions were simultaneously abolished; while exports of home-grown cereals, either in grain or in flour, were prohibited A decree issued on September 9, 1939, to guarantee cereal supplies for the population, prohibited the feeding of breadmaking cereals (rye and wheat) to livestock. As it became possible gradually to import considerable quantities of breadmaking cereals, this prohibition was amended in such a way as no longer to effect the small farms; other farms could obtain an exemption in respect of specified quantities of cereals. The small farms which had handed over their breadmaking cereals could, through the intermediary of the State, obtain fodder cereals in exchange. Moreover, a decree dated September 16, 1939, established the following maximum prices for home-grown cereals: rye 19 crowns, wheat 18 crowns, barley, oats and mixed cereals 17 crowns per 100 kg. At the same time, the control over all imports of breadmaking cereals was concentrated in the hands of a single office, the "Brødkornskontor", consisting of representatives of the Government and the corn trade. Imports of fodder cereals and fodder were centralized in a similar way in a central office entitled the "Centralkontor". The maximum prices quoted above remained unaltered throughout the whole of the 1939 season, with the exception of quantities used for spring sowings which were sold at a higher price.

Since it became necessary, owing to the blockade, to expect a complete cessation, after April, 1940, of imports of cereals and oilcake, which used under normal conditions to reach some 15 million quintals, all measures concerning fodder cereals were of necessity tightened. It was once more absolutely forbidden to use rye and wheat for feeding purposes, farmers were compelled to hand over their stocks of these cereals to the mills or to the wheat merchants, while free trade in foreign fodder cereals was abolished, as also, shortly afterwards, that in oilcake. The remaining stocks of foreign fodder cereals were allowed to be used during the following months for horses not employed in agri-

culture and were also granted to the small farms while oilcake could be used for milch cows, at the rate of 40 kg. per head.

Every effort was made to make the best possible use of the 1940 harvest. In the first place it was essential to ensure the supply of bread and meal for the people, due account being taken of the fact that the winter consumption would be increased owing to the shortage or higher price of other commodities. The quantities which consequently remained available for domestic animals had to be much smaller than usual and this explains why the head of livestock had to be greatly reduced (see below). Under these circumstances it was therefore extremely unfortunate that, owing to the long period of hard frost, the 1940 harvest was poor, especially in respect of breadmaking cereals

The measures concerning the compulsory legal delivery of cereals, etc., were embodied in the law dated July 25, 1940, concerning the wheat regulations for the 1940-41 season Under the terms of the above law, all the rye and wheat harvested in 1940 had to be handed over, with the exception of wheat for seed and winnowed wheat unfit for human consumption. All rural holdings whose land value exceeds 10,000 crowns had to hand over 5 to 8 quintals of breadmaking and fodder cereals for every 1,000 crowns, or part of it, of the value of their land, the deliveries increasing progressively with the increase of the value of the land over and above the figure of 10,000 crowns. The proportion of fodder cereals to be delivered was made to depend upon that of breadmaking cereals. The holdings whose total production was below the quantities which had to be delivered, were compelled to hand over practically the whole of their output, though they were permitted to keep the minimum strictly necessary for their own needs. Wheat prices fixed by law were sensibly higher than in 1939, for rye it was 29 crowns and for wheat 28 crowns, while the price of barley, oats and mixed cereals was 25 crowns per 100 kg. Most of the wheat delivered is used for supplies of flour and meal; moreover, small holdings (with a land value of under 10,000 crowns), have the right to purchase a given quantity of fodder cereals ("Ombytningskorn"), corresponding to the quantity of breadmaking cereals handed over, while 100,000 tons of wheat ("Tildelingskorn") were made available for the small holdings (whose value varies between 500 and 5000 crowns), practically all of whose output of animal products depends on purchased wheat; lastly very small quantities of wheat were set aside for the raising of pigs and poultry in the breeding centres, experimental stations, etc. Industrial consumption of wheat had to be covered by quantities of barley and oats ("Frihandelskorn") which the farmers, after making their deliveries, might eventually sell to authorized merchants at 28 crowns per 100 kg.; but very little of this "Frihandelskorn" was offered on the open market. In order to encourage deliveries, the maximum price for lots of barley and oats of exceptionally good quality and well winnowed, absolutely suitable for human consumption and sowings, was raised in November from 28 to 30 crowns per 100 kg.

The plan for the distribution of the harvest under the wheat regulations was carried out on the whole most satisfactorily, even though it was obviously difficult to adjust the head of cattle to the small quantities of fodder; it was also necessary to take measures in connection with the distribution of fodder cereals in the spring of 1941 (see below). Owing to the small quantities of wheat offered on the open market, the small amounts of wheat in the Government stocks had to be made available for industry.

The wheat regulations for the 1941-42 season were prepared in final form during the winter, since it was important that the farmers should know how the wheat would be distributed before beginning spring sowings. These wheat regulations for 1941

are embodied in the law of April 16, 1941, and are, generally speaking, based on the same principles as the regulations for the previous year. The amount of wheat requisitioned, however, is 140,000 tons in excess of last year's figure; this is chiefly because the bread ration has been increased and because the cereals intended for the various industrial uses (breweries, coffee substitute factories, etc.), are now included in the distribution; under the former regulations these cereals had to be purchased on the open market. Deliveries amount to 500 kg. for every 1000 crowns of the value of a holding valued at between 8,000 and 12,000 crowns and to 1,050 kg. per 1,000 crowns of the value of a holding assessed at over 100,000 crowns. The total quantity requisitioned comes to 870,000 tons of cereals; 410,000 tons for breadmaking and milling; 100,000 tons for transformation into meal; about 55,000 tons for other industrial uses and the remainder for the small holdings, breeding centres, etc., stables, pig breeding and independent poultry rearing. After making delivery, each grower has the right to sell the remainder of his cereal fodders to other farmers on the open market at a suitable price. Under the new system for 1941, farms are more readily granted the right to, in determining the quantity of cereals to be delivered, exclude from the total area under cultivation forests, moors and dunes; the rate of delivery, moreover, is reduced when, owing to special circumstances, such as the vicinity of the farm to a town, for instance, the land value is particularly high. The maximum prices fixed for deliveries are the same as those for the previous year, except in the case of cereals for industrial purposes and for the feeding of horses not engaged in agricultural work, the supplement of 10 crowns added to the price of cereals is granted to all farms.

In order to ensure the highest standards of cultivation, certain measures have been taken to guarantee an adequate supply of seed for every rural holding. In 1940 and 1941 the price of seed grain was permitted to rise higher than that of other cereals in order to bring a sufficient supply to the market. The purchase of cereals for seed was also facilitated in another way. every alternate year the farmers were granted, free of interest, loans for the purchase of seed, lastly, in the spring of 1941, the Government was in a position to draw upon its own stocks in order to supply seed grain to farmers on credit, repayable when the crop had been harvested.

Maximum prices were also fixed for bran, etc.

*Sugar beet.* — As regards the output of sugar beet, the system in force for several years in connection with sugar was maintained until the spring of 1940 (law of April 12, 1940); the price of sugar beet, however, was raised from 220 crowns to 289 crowns per 100 kg.; the area sown to sugar beet was increased by 10 per cent. during the spring of 1941; the price of sugar beet was again raised (law of March 16, 1941, concerning sugar regulations) and fixed at 410 crowns, while the area under sugar beet was again increased by 10 per cent. If this last-mentioned measure had not been adopted, the crop would have been poorer than in the previous year because farmers had used less fertilizer. A satisfactory yield of sugar beet was obtained in 1939 and 1940, the output of sugar being between 225 million and 230 million kgs.

*Animal production.* — Animal production did not change much during the early months of the war, although supplies of oilcake were low and prices were not high enough; on the other hand, as has already been stated, the return on animal production was unsatisfactory and in order to increase it, recourse had to be made to Government subsidies.

Although England suspended the bacon quota immediately after the declaration of war, the regulations restricting pig breeding which had been in force for several years were maintained throughout 1939 and in 1940, because there was no advantage

in altering them; when, however, during the negotiations with England at the beginning of 1940, it was realized that exports would have to be still further curtailed, an attempt was made to reduce the number of pigs by slaughtering animals weighing between 40 and 50 kgs., etc. The existing butter regulations were also maintained until the end of 1940; the price of home-produced butter increased, however, from 2.60 to 3.00 crowns per kg. after January 1, 1940; the price of butter for export rose from 2.35 to 2.40 crowns.

The situation of production changed when the blockade came into force. While the yield improved, the extremely small quantities of fodder imported gave rise to difficulties resulting in a decline in output. As was to be expected, the consumption of cereals was between 8 million and 9 million quintals less than before the war, while that of oilcake declined by between 7 million and 8 million quintals. The importance of oilcake in the output of milk is well-known. The report of a commission of experts appointed by the Central Chamber of Agriculture was used as the basis for the reduction of livestock during the autumn of 1940, this reduction being rendered necessary by circumstances. It is stated in this report that the part of the livestock which cannot be easily replaced must be preserved as much as possible, especially the herds of milch cows, while the numbers of pigs and hens, as well as the breeding of mares and steers, must be reduced. In short, the numbers of pigs and hens were to be reduced by 50 per cent., herds of horned animals by between 15 and 20 per cent, *i. e.*, between 6 and 7 per cent of milch cows and about 25 per cent of young cattle

The following are a few details concerning the various products. In spite of the slight reduction made in the herds of milch cows, the *butter output* had already declined during the autumn and winter of 1940 as the result of reduced feed ration, and especially owing to the shortage of oilcake. This fall in the butter output became more marked in the spring of 1941 because, owing to the persistent cold weather and the bad condition of pastures, the cows were sent out grazing very late. The summary given below will show the extent of this decline in output. Mention has been made above of the increase in the price of butter for export, the rise in prices was of greater importance in the case of butter than in that of other commodities, because the price of butter was already the lowest and also because butter was the product which Germany needed most. In July, when the export price was higher than that fixed for home produced butter under the butter regulations, the latter was abolished and the export price became operative on the home market as well. The home market, moreover, absorbed much larger quantities of butter than under normal conditions, because the small stocks of margarine were gradually distributed among the poorer classes after April. Since the export price continued to rise and the Government considered that the people's supply of butter must be guaranteed at a reasonable price, it was decided in the autumn of 1940 that the price of butter within the country must not be increased; the surplus obtained from the subsequent increases in the export prices was to be distributed among producers in the form of a supplement; this supplement amounted in November and December to 16 Øre per kg. of butter or to 0.7 Øre per kg. of milk, and later to 45 and 56 Øre per kg. of butter or to 2 and 2 ½ Øre respectively per kg. of milk. In order to maintain a sufficiently large supply of butter for export in spite of the reduction in output, home consumption was rationed as from December, 50 gr. being allowed per person daily.

The *herds of pigs* were slightly reduced during the summer of 1940, but many farmers were strongly reluctant to reduce this most lucrative branch of agriculture, so that the reduction took place more slowly than was desired. Several measures

were adopted during the autumn of 1940, to stimulate slaughter, including changes in the duration and validity of pig cards, which entitled the breeder to obtain higher prices, and changes in the duties payable by the breeders for the pigs slaughtered in general and for those below a specified weight in particular. During the latter month of 1940 so many animals were slaughtered that the numbers of pigs did not exceed the limits fixed, *i. e* half the former number. Since it became easy to sell the young pigs, it was useless to maintain the regulations which were repealed on December 31, 1940. In order to guarantee a fair distribution between the home and the foreign markets, slaughtering was concentrated, with some exceptions, in the authorized export slaughterhouses. The export price of pig meat also increased slightly during the summer and autumn of 1940, but this increase was very much less marked than that of butter. The price of pig meat on the home market, together with the price of butter, was fixed in the autumn at the level then current, *i. e*, at 2 40 crowns per kg. In April, 1941, maximum prices were fixed for pig meat on the home market; the decline in prices to the advantage of the consumer was obtained by adjusting prices between retailers and wholesalers, while the price paid to the farmers remained the same

It was not found necessary to adopt so many measures in order to secure a reducton in the numbers of *poultry*, since the export yields were very low. Even before January 1, 1941, the poultry trade seemed to have been reduced to the desired proportions, because, ever since the beginning of the new year, the output of eggs has only been one-third of the normal

Lastly, in the case of *horned cattle*, an attempt was made in the autumn to divert the trade in produce-yielding animals and those for slaughter to Germany as quickly as possible prices increased several times during August and September; it was planned to reduce prices in October and November. But exports did not reach satisfactory figures and prices again increased in November. Even so the numbers still appeared to be too high, in order to encourage export, an export bonus was paid during the period May 18-June 28, 1941, amounting to 16 Øre per kg. live weight during the first three weeks and 8 Øre in the next three weeks

*Output of agricultural products of animal origin.*

Monthly quantity indices.

| 1935 = 100 | Milk | | | Beef and veal | | | Pig meat | | | Eggs | | | Total products of animal origin | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1941 | 1940 | 1939 | 1941 | 1940 | 1939 | 1941 | 1940 | 1939 | 1941 | 1940 | 1939 | 1941 | 1940 | 1939 |
| January | 60 | 87 | 88 | 92 | 122 | 107 | 65 | 87 | 97 | 48 | 136 | 126 | 64 | 95 | 97 |
| February | 59 | 88 | 92 | 87 | 120 | 143 | 60 | 78 | 98 | 39 | 118 | 152 | 60 | 90 | 105 |
| March | 63 | 97 | 98 | 90 | 138 | 118 | 58 | 130 | 101 | 65 | 143 | 170 | 64 | 118 | 108 |
| April | 68 | 103 | 108 | — | 145 | 118 | 58 | 79 | 95 | 105 | 184 | 185 | — | 105 | 112 |
| May | — | 112 | 125 | — | 155 | 121 | — | 114 | 85 | - | 210 | 198 | - | 126 | 116 |
| June | — | 119 | 127 | - | 114 | 92 | — | 90 | 106 | -- | 174 | 164 | - | 112 | 118 |
| July | — | 99 | 118 | — | 144 | 99 | — | 131 | 87 | — | 130 | 144 | — | 119 | 106 |
| August | — | 88 | 111 | — | 188 | 114 | — | 101 | 103 | --- | 99 | 137 | — | 103 | 110 |
| September | — | 75 | 101 | — | 263 | 135 | — | 113 | 89 | — | 78 | 126 | - | 108 | 102 |
| October | — | 68 | 90 | — | 210 | 137 | — | 90 | 94 | — | 44 | 70 | — | 88 | 94 |
| November | -- | 64 | 85 | -- | 118 | 136 | — | 81 | 105 | — | 23 | 74 | — | 72 | 97 |
| December | — | 61 | 87 | - | 88 | 110 | — | 79 | 112 | — | 40 | 133 | — | 68 | 103 |

In autumn an attempt was made to reduce the price of meat on the home market by abolishing the slaughter tax; maximum prices for beef and veal were also fixed in April on the basis of the price of pig meat.

The reduction in the output of agricultural products of animal origin resulting from the difficulties encountered in feeding livestock may be observed in the table on page 273.

### Policy concerning agricultural output.

In order to obtain the highest possible yield of home-produced fodders, the Treasury granted assistance to farmers for the *erection of silos*, thus 5 million crowns were made available in the spring of 1940 in the form of non-interest-bearing loans (law of April 26, 1940); this law was amended by the law of October 31, 1940, which replaced these loans with credits Continuing the application of existing laws, the Government also appropriated 10 million crowns in the form of loans or credits for maintaining the measures connected with hygienic stabling Apart from these laws, all the measures taken in the autumn of 1940 for increasing the employment of labour contemplated various amendments to the legislation concerning *land improvement*, these amendments were intended to make it possible to execute land improvement works and the building of dams to a much greater extent than previously (law of November 14, 1940 in amendment of the law on land improvement dated February 26, 1937, and law of November 14, 1940, concerning the building of dams)

### Agricultural insurance.

During this difficult period when it became necessary to create a form of *war insurance* in some branches, agriculture was also assisted by a special form of insurance against war risks. The law of May 30, 1940, introduced insurance for movable farm property, including technical implements on farms and privately-owned movable property. This law instituted a mutual insurance syndicate whose task was to arrange for the compulsory insurance of the properties concerned, if they were already insured against fire. The law dealt especially with the movable property required for continuing the operation of the farm; it guarantees the immediate payment of compensation in case of loss. In other cases the payment of compensation (and the collection of bonuses) will only take place after the war. Farm buildings are insured against war risks on similar principles by an insurance syndicate for farm buildings created under the terms of the law of December 22, 1939. Lastly, the « Rigsdag » is at present drafting a law providing war insurance for farm lands. Under the terms of this law, every owner of a farm is compelled to take out an insurance of this kind and including, besides the land belonging to the farm, works connected with the damming of water, crops, bridges, dams, etc.

### Rural social policy.

Among the measures adopted in the autumn of 1940, for the purpose of lessening rural unemployment, mention should be made, besides the laws mentioned above, of three laws whose purpose was to improve conditions in rural dwellings; these laws were those of October 31, 1940, and January 31, 1941 concerning *repairs to rural premises* and of October 31, 1940, concerning the erection of *dwellings for farm workers*.

The first of these laws authorizes farmers to obtain credits (up to 25 per cent. of their outlay and not exceeding a total of 5,000 crowns) and loans (maximum 15,000 crowns) not exceeding in all 70 per cent. of the cost of repairs, reconstruction, and construction of private dwellings or farm buildings. The total sum made available to the farmers amounts to 25 million crowns, most of which has already been used. The third law is the continuation of the two previous laws; it opens a credit of 8 million crowns in the form of loans part of which bear no interest and amounting to 9/10 of the outlay involved in the construction of workers' dwellings.

## Agricultural labour.

During the month of March, 1940, agriculture was threatened with a serious labour dispute, involving between 20,000 and 25,000 workers employed in agriculture and forestry, etc., whose contracts expired on April 1st The public arbitrator had taken over the matter at the time of the German occupation After a two months' adjournment, the dispute was settled in the beginning of June before a trade council on the basis of the law dated May 30, 1940. The arbitral award granted an allowance for the high cost of living almost similar to that enjoyed by industrial workers with a labour contract employed in towns (for instance, dairy workers and butchers, boilermen and butchers' trade and office employees), rural workers did not as a rule receive an allowance for the high cost of living. In October, 1940, when prices had again increased, and when it became necessary to give the less well-paid town workers a bonus, a convention was concluded between employers and workers in agriculture and forestry providing for a bonus to dairy and farm workers This bonus usually amounts to between 3 and 6 crowns weekly The labour contracts of between 40,000 and 50,000 farm workers, etc., came to an end in the spring of 1941. Since the parties concerned were unable to come to an agreement on wage questions, these problems were settled by an arbitration commission appointed in September, 1940 (law of September 14, 1940). This commission took the place of the former arbitration council for the adjustment of labour contracts until November 1, 1941. The wage question affecting agricultural workers was settled as follows the high cost of living allowance for male day labourers on farms was increased by 90 Øre per day, the wages of other workers (dairymen, farm servants, forestry labourers, etc.), being increased in an almost equal proportion Various measures were adopted to provide assistance for the urban industries which suffered severely from unemployment and for agriculture where there was often a labour shortage. Mention may be made of the emergency law of May 30, 1940, which contained measures for speeding up the resumption of work and the engagement of workers. Under the terms of this law, labour employment commissions were established in every town and rural commune for the purpose of putting the unemployed in touch with employers requiring labour. In order to prevent young workers from refusing employment on the land, the law grants unemployment allowances or other allocations to those who are not responsible for the support of a family, for a period of two months only, unless the employment commission supplies them with a certificate testifying that there is no work available in the district. Special peat digging was organized during the summer of 1940 and attracted a large number of field workers and the employment commissions were authorized, in case of necessity, to divert workers specialized in peat digging to do farmwork and to replace them with workers unskilled in field work. The law of May 30, 1940, was abrogated on March 31, 1941. As it was absolutely essential that sufficient labour for the extraction of peat and for farm work should be available during

the summer of 1941, the law of April 8, 1941, concerning the guarantee of adequate labour for agriculture (which replaced the previous law), had to issue stricter and more detailed regulations in order to ensure a fair distribution of unemployed labour. The law provided that unmarried workers under 25 years of age belonging to the rural communes could not be engaged in non-agricultural work, unless it could be proved that no labour was required for agriculture; it compelled the employment commissions to adopt measures to ensure that an adequate number of unmarried workers under 25 years of age and skilled in farm work should be available for the farms, stressing the fact that the farms were in need of this labour. The law also gives the employment offices and commissions full power to employ the labour required for the most urgent work.

*(Concluded June 28, 1941).*

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## *BIBLIOGRAPHY ON ECONOMIC AND SOCIOLOGICAL SUBJECTS*

VINK G. J. De grondslogen van het Indonesische Landbouwbedryf. Dissertation delivered at the Agricultural College of Wageningen, published by H. Veenman & Zonon, Wageningen, 1940.

[In the volume under review C. J. Vink endeavours to discuss a number of fundamental aspects, and draws a clear line between a peasant farm and a business undertaking. In the Netherland Indies the latter is as a rule capitalistically organized, whereas the former includes also the most primitive peasant undertakings constituting the major part of agricultural units in the Tropics.

It is not always possible to draw a clear line between the farm economics concerned with the study of management, organization and systems of cultivation, and the general economics of agriculture. The study of farm economics presents also another difficulty: in order to understand the real value of its different parts one must possess a thorough command of the subject as a whole, while the subject as a whole cannot be understood if its constituent elements are not known. This difficulty is particularly great when dealing with farming in the Tropics. It must be added that in the Tropics the individual is bound by a number of habits to the tribe, village or family, which renders the study of the various problems of farm management particularly difficult.

Of the three factors which, not only in the Tropics, are essential for farming, nature plays by far the most important in the case of farms of primitive type. Work is but of slight importance; it is often reduced to pulling the new offshoots of the sago palm tree and transplanting them in another place.

*A*) NATURE. — The most important elements belonging to nature as factor of production are soil, water, temperature, light and air.

In the Tropics the duration of soil utilization plays an essential part. When cleared land has been under cultivation not too long, it can again recover its primary fertility by means of afforestation. For this reason, the soil under the Tropics can be in principle cultivated in two different ways. (1) after a short period of cultivation it can again be put under fallow; (2) by means of a great outlay of labour and capital it can even be cultivated permanently (sawaha, terrasses).

The nature of the soil (heavy or light) is an essential consideration in deciding upon its utilization. The physical condition of the soil also exerts a direct influence on its cultivation.

One of the outstanding differences between the large capitalistic farms tending to obtain a high return from capital, and the peasant native farms lies in the fact

that under tropical conditions the soil renders both possible The capital is being invested only in those soils which are especially adapted for a definite marketable produce. The native, on the contrary, is limited in his choice being bound by his birth to certain districts.

The soil is the essential factor. Capital and labour find in it a necessary complement, and when they combine, land itself, from the economic point of view, becomes a form of capital (land capital).

*Water* may be a gift of nature or a result of artificial irrigation. In the latter case it belongs to the soil improvement capital.

In regions with abundant rainfall the choice of cultivated plants is limited, especially where the soil is naturally poor. Only bush plants are adapted there The oriental coast of Sumatra and the peninsula of Malacca used to be scarcely populated before the European settlement. Even to-day their wealth is derived from the cultivation of tree plants such as the oil palm tree, rubber and tobacco under systems of rotation lasting for many years all plants which can adapt themselves to the conditions of rainfall On the contrary, regions rich in lime, which are subject to long periods of drought, possess a surprising density of population. Even when these two factors —heavy rainfall or the scarcety of lime—do not alone determine the density of the population, they are nevertheless very important.

The conditions of rainfall exercise a determining influence also on animal husbandry in the Tropics

The *temperature* in tropical regions, depends on the altitude The influence of temperature on the growth of plants is, however, to a large extent neutralized by selection The coffee used to be cultivated on the high plateaux; now selected varieties are successfully grown in low valleys as well.

*Light* exerts harmful effects by desintegrating the humus of tropical soils; it has, however, benefical effects on the vegetation during the periods when the days are short.

A more detailed study should demonstrate how well peasant farming in the Tropics adapts itself to natural conditions Habits, which could be judged as primitive, are often essentially rational and are imposed by cogent reasons

*B*) LABOUR. -- After nature, the labour factor comes next in importance in agriculture For those living in the Tropics it is even more important than capital For the European, labour is synonymous with great exertion; the Javanese, on the contrary, uses the same word for feast and for working day. This owes probably its origin to the fact that work must, or often used to, coincide with days of religious ceremonies.

The majority of tropical farms are family farms. Even clan or village farms markedly bear the character of a family undertaking. When dealing with labour, a distinction must be made between peasant farms and commercialized farms working for profit. The budget of a capitalist undertaking is about as follows.

| | |
|---|---|
| Gross return | 100 |
| Farm operating expenses | 10 |
| Wages | 60 |
| Net return | 30 |

The peasant farm will give a net return of 90 - that is a net return three times as high as that of an intensive capital investment. Thus the family farm can still be a paying proposition when a capitalistic farm works at a loss.

The family farms also have periods of labour pressure. In peasant settlements work is ensured by mutual assistance, which may be occasional, but may also be based upon stronger bonds of reciprocity. The labourers engaged for fixed periods are often treated as members of the family. Some labourers are living on the landowner's land on condition of the execution of some definite work. More often the wages of the native worker in tropical agriculture partly consist in contributions in kind. Mutual assistance is strictly based on reciprocity. There often exists another form of remuneration: for example, women who lend their services at planting time may claim to be employed at harvesting time, thus obtaining their share of the crop.

Tropical agriculture is often marked by highly developed division of labour sanctioned as a rule by tradition. Women carry on generally the work of planting, whilst men are responsible for animal husbandry and for hoeing.

The reply to quite a number of questions on agricultural economy depends on a careful investigation into labour. For agriculture in the East Indies Suchan this enquiry has been attempted and the author gives a number of data which, however, only contain very general figures and do not throw the proper light on the problem. It is also very difficult for Europeans, who from many points of view have remained aloof from the peasant, to carry out such a study. The conclusion is nevertheless interesting; it demonstrates that intensive cultivation of sawah rice in Jawa has often been carried so far as to exceed the optimum.

C) CAPITAL — Following Böhm-Bawerck in his definition of capital, the author elucidates certain notions and considers the soil as an economic good from the moment when its available area is limited, and when measures for its preservation have to be enforced. It then becomes a form of agricultural capital.

The *land-capital* is a fixed capital compared with the circulating capital. Its amount is determined by certain conditions such as the geographic situation, the density of the population and the natural factors (natural wealth) On account of the variety of native social customs in the Tropics, the conditions of land ownership vary much. There are also various ways and possibilities of getting into possession of landed property. Land reclamation, loan, taking on lease and mortgage are the most frequent. In like manner the ways of working the land vary according to individual dispositions and to customs existing in different regions.

The other parts of farm capital can be divided as follows: (a) *Land reclamation capital*, which is mainly constituted by water collecting and irrigation works. (b) *Building capital*, which does not play an important part in the Tropics, contructions being very primitive. (c) *Livestock* In East India, this latter comprises mainly buffaloes and native cattle breeds and crossbreds of the zebu Horses and other draught animals are not generally used Amongst the other animals, the hen alone still holds as a rule a place worth mentioning. (d) *Dead stock*. In the tropical regions the dead stock plays seldom an important part from the financial point of view. As a rule, working implements are home made. Now and then, however, more expensive implements, such as steel ploughs, have been introduced. Mention sould be made of some other forms of capital comprising planting material, field cultures, stocks, permanent plantations, all elements similar to those found in other zones.

Viewed as a whole, this volume gives an excellent idea of the various aspects of tropical agriculture in the Netherland Indies as well as the various methods practiced; it represents a useful piece of work on rural economy specially concerned with tropical agriculture].

C. A. GEHLSEN

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Prof. UGO PAPI, *Segretario generale dell'Istituto, Direttore responsabile.*

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# MONTHLY BULLETIN

OF

# AGRICULTURAL ECONOMICS AND SOCIOLOGY


## THE INFLUENCE OF CHANGES IN AGRICULTURAL PRODUCTION AND MARKETING UPON FARM LABOR IN THE UNITED STATES [1]


by Dr. MURRAY R. BENEDICT


CONTENTS:
I. Historical background of farm labor in the United States prior to 1920. — II. Agricultural labor in the post-war period. — III. Types of agricultural labor: *The hired man. The cropper. The migratory casual worker. The part-time farmer.* — IV. Factors affecting agricultural labor: *Changes in agricultural production. Changes in gross farm income and farm wage rates. Mechanization. Proportional changes in type of agricultural commodities produced. Marketing method. Changes in farm tenure. Farm indebtedness. Changes in consumption habits. Changes in government policy. National defense program.* — V. Special problems in agricultural labour: *The southern share cropper. The western migrant casual worker. Large-scale farming.* — VI. Summary.

### I. — Historical background of farm labor in the United States prior to 1920.

For adequate understanding of the farm labor situation in the United States it is necessary to review briefly certain phases of the history of American agriculture. Institutional factors which grew out of conditions prevailing in earlier periods still exert an important influence on the position of farm labor. Most important among these are: one, the dominant influence of the frontier until near the close of the Nineteenth Century, two, the institution of Negro slavery, which persisted until the close of the war between the states in 1865, and, three, the extensive use of racially distinct groups of farm wageworkers on a casual basis, especially in the Pacific Coast states. The labor relations of these earlier periods have given rise to attitudes, types of farm organization, and various institutional arrangements which are important elements in the present-day problem despite the fact that the conditions from which they arose have changed materially.

During the first half of the Nineteenth Century United States agriculture was still in large measure on a self-sufficing, noncommercial basis except for the areas producing cotton and tobacco. Hired labor status on farms, except where slave labor was used, was generally regarded as a temporary condition to be followed by entrepreneurial status. Unoccupied lands were available over large

[1] Acknowledgment is made for the assistance given by Dr. Beatrice McCown Mirkovich in assembling materials for this paper and aiding in the preparation of the copy.

areas and at small cost. As transportation facilities were created and horse-drawn machinery became available, the agriculture changed rapidly to more commercial types but continued to use relatively little wage labor except in certain areas of highly specialized farming. Since unoccupied farm lands were still plentiful, pioneer attitudes continued dominant, and there was no permanent wage-hand class except among certain foreign groups in the Pacific Coast states. These were in the main orientals. Later, particularly after 1920, considerable numbers of Mexicans were employed both in the fruit and vegetable industries of California and in the sugar-beet growing areas farther east.

Prior to 1920 there was little tendency for agricultural employees to organize. On the family farms workers were usually employed singly or in very small numbers. Their viewpoint was more that of an employer than of a wage laborer since they expected eventually to become entrepreneurs. Most of them were either sons of neighboring farm operators or newly arrived immigrants from the European countries. In the former slave states, that is, chiefly in the southeastern quarter of the country, local attitudes and conditions were decidedly unfavorable to the organization of farm workers, whether white or black. The relationship between the races was such that organization of the colored workers would not have been permitted, and there was no tendency for white and colored workers to join forces. Little leadership was available in either group. On the West Coast the oriental and Mexican groups were in a weak bargaining position. The majority of them were noncitizens and belonged to sharply segregated racial groups Furthermore, they were in most cases receiving markedly higher wages than had been available to them in the places from which they came and hence were not actively dissatisfied with their lot. In the Great Plains wheat area large numbers of casual workers were employed for short periods during harvest, but they were too scattered and too casually in touch with each other to make organization practical even had there been a significant desire for it. There were occasional sporadic undertakings by the radical organization known as the Industrial Workers of the World, but no continuing organization resulted.

By 1900 the agricultural frontier had virtually ceased to exist, and good new lands were no longer available for homesteading. From this time until 1914 conditions were such that there was relatively little unrest on the part either of farmers or wageworkers (1). The prices of farm products were rising, land

(1) In a recent article on this subject Schwartz makes the following comment: "Unions of farm laborers in this country first attracted notice in the years 1909-18 when the IWW achieved some strength among migratory wheat harvesters and fruit workers. The 'Wobblies' had been preceded in their efforts by local groups in California, usually organized on a racial basis, by the sheep shearers in the Mountain States, and by the AFL which made some weak organizational efforts along the West Coast in 1909 and for some years afterwards, but without much success. With the practical destruction of the IWW during the first World War, farm labor unionism was almost nonexistent during the 1920's, but became a force of some importance in the 1930's. Harry SCHWARTZ: "Organizational Problems of Agricultural Labour Unions". *Journal of Farm Economics*, American Farm Economic Association, May 1941, pp. 456-457.

values were on the increase, and industrial outlets for surplus workers from the farms were rather generally available [1]. Very large numbers of the urban workers of this period had come from the farms and from foreign countries, both groups to substantially higher money wages than they had been accustomed to receiving. Employer-employee friction, especially in the rural areas, was not characteristic of the period, except for local situations such as those in the hop and fruit growing areas of the Pacific Coast states.

The war period (1917-19) was marked by a comparative scarcity of farm wageworkers, due in large part to the induction of great numbers of farm boys into the army. Wage rates reached relatively high levels, and farm operators were much disturbed by the scarcity of competent workers. There was, however, no important disturbance in labor relations and very little progress toward permanent organization either of employees or employers. The introduction of power machinery was given some stimulus, but this did not come to large importance until later. The process of mechanization is still going on, apparently at an accelerated rate

## II. — Agricultural labor in the post-war period.

The decade of the twenties was in the main one of great industrial activity except for the brief depression of 1921-22. During that decade there was a significant amount of technological unemployment, mainly urban, but on the whole unemployment did not present a major problem in either urban or rural areas.

By the early 1930's, however, conditions had changed markedly. Several factors had combined to bring about the most severe and prolonged depression in the nation's history. This reacted with special severity upon wage labor in agriculture. Great numbers of young workers who would normally have found work opportunities in the cities were, perforce, retained in the rural areas because of the lack of jobs in the cities. During these years also, unprecedented drouth conditions forced thousands of farm families off lands in the semi-arid Great Plains region. At the same time the rapid introduction of power machinery was displacing many tenants and other small farmers, particularly in the southern Great Plains area. These factors operating jointly and all in the same direction created a vast reservoir of farm people without adequate work opportunities. In an effort to better their condition, thousands of them trekked westward seeking casual employment and new farming opportunities in the Pacific Coast states.

The deplorable conditions resulting from this migration were widely publicized, and the problems of the casual worker in agriculture came much more

(1) See Frederick STRAUS and Louis H. BEAN: "Gross Farm Income and Indices of Farm Production and Prices in the United States, 1869-1937". *U. S. Dept. Agr. Tech. Bul.* 703, December 1940, p. 140.

into public consideration than ever before. Special agencies were set up to ameliorate the most desperate conditions, and two different congressional committees investigated the conditions of agricultural workers (1). Considerable research together with some minor legislative action has been initiated. While the progress toward a solution of the problem has been modest indeed, it is safe to say that the nation is evincing vastly more concern with respect to the farm labor group than at any time since the struggle over Negro slavery.

It would not be proper to leave the implication that all was well with farm wageworkers prior to 1930. Conditions of work, rates of compensation, and social status were in many cases very bad, and a few serious clashes between laborers and their employers occurred. In general, however, the supply of farm workers was not so greatly in excess of numbers needed that willing workers could not get jobs or find a way to exist. Prior to 1933 the contrast between the legislative aids for farm wageworkers and those for industrial workers was not so marked as in recent years. Comparatively little social legislation relating to either group had been passed. It is true that urban workers were more fully organized and that they had succeeded in securing for themselves a good many advantages in the way of shorter hours, higher rates of pay, and improved working conditions. Most of these were not provided through legislation.

With the provision in the past decade of unemployment insurance, old-age pensions, and similar progressive measures for industrial workers, the inequalities between agricultural and urban wage labor became much more pronounced, since agricultural labor was specifically excluded from the benefits afforded by these measures. This exclusion resulted in part from the opposition of the farm employer groups, in part from the recognized difficulties of administering social legislation for farm employees, and in part from the traditional attitudes of nonemploying farm operators, who were in general somewhat unfriendly to governmental interference in matters of this kind.

## III. — Types of agricultural labor.

Before undertaking to analyse recent changes in the agriculture of the United States and their effects upon farm labor, it is necessary to sketch briefly certain major categories of labor and of farm conditions. Farm workers throughout the nation cannot be treated as a unit since conditions of work

(1) Among these were the Resettlement Administration, later reorganized and renamed the Farm Security Administration, and the various federal, state, and local relief agencies. Extensive investigations were carried on in 1939 and 1940 by a subcommittee of the Committee on Education and Labor, United States Senate, Seventy-sixth Congress, third session (commonly known as the La Follette Civil Liberties Committee) and in 1940 and 1941 by the Select Committee to Investigate the Interstate Migration of Destitute Citizens, House of Representatives, Seventy-sixth Congress, third session (the Tolan Committee).

and types of worker vary widely. At least four fairly distinct groups or types of farm labor are readily distinguishable. These are:

(1) The traditional *hired man.* This is usually a white worker, often a son of a neighboring farmer or a recently arrived European immigrant. He is employed on the moderate-sized, commercial farm and works and lives in close contact with the farmer and his family. Such workers are likely to number no more than one or two per farm, and seldom will there be more than four or five on any one farm. Payment usually includes food, housing, and laundry, and the worker is likely to live in the farmer's home. Wages are generally paid by the month, and work is apt to be continuous through most or all of the year.

Many of these workers will eventually become farm operators through inheritance, marriage, or by moving up to tenant status This type of farm wage-worker is common on the larger farms of the corn belt (Middle-Western States), in the dairy region (North Central States and New England), and in much of the Great Plains area (West Central States). Wage rates for these workers are customarily low when compared with city wages, but serious want and privation are unusual except when numbers are so great that steady employment cannot be obtained. There has never been much tendency for farm workers of this class to organize into unions, and serious or general employer-employee friction is rare

(2) A second major type of farm worker is the so-called *cropper*, a type confined almost entirely to the specialized cotton states of the South and South-East. These workers are classed as farm operators in the United States Census They work small tracts of land contributing only the labor. The land, power, equipment, seed, and supervision are usually provided by the landowner Payment is made as a share of the value of the crop. Earnings are very low, and the cropper is customarily in debt to the landowner for food and clothing supplied. Often such supplies are provided through stores operated by the landowner

The cropper is essentially a wageworker paid in kind Thus his income varies both with the yield and price of the product, which is usually cotton. The cropper system is in large measure an institutional survival from the adjustments which followed the freeing of the slaves However, considerable numbers of so-called "poor whites" have fallen into this status and operate in the same way and for about the same returns as the colored workers. The census of 1935 reported 716,256 cropper-operated "farms" About half of these "operators" were colored, and about half were white. They, together with their families, constituted a population of 3,120,000 persons.

It is evident that the impact of changing methods in agriculture and of prices for farm products is different for these workers than for wageworkers such as those described under number (1) above. Likewise they present specially difficult problems from the standpoint of social legislation. They are among the poorest paid groups with the lowest living standards in the United States.

(3) The *migratory casual worker.* These workers constitute a third class which is markedly different from either of those described above. Their major

concentration is in the fruit, vegetable, and sugar-beet growing areas of the Pacific Coast, the southeastern states, the Atlantic seaboard, and the Mountain States ([1]). They have little in the way of settled tenure relations to any specific farm. Instead, they move from area to area, working for short periods in each place as the crops develop. The work is highly seasonal and is more often than not compensated on a piece-work basis. This type of labor has been common in California since the latter part of the Nineteenth Century, though the composition of the labor force has varied considerably from period to period. Much of the early labor supply consisted of Chinese workers brought in originally for the building of transcontinental railroads. With completion of these lines many of the workers became available for the developing agricultural industry and were employed in it. They were mostly single men and soon disappeared either through aging and death or by return to China.

Other groups which assumed importance, especially on the Pacific Coast, were Japanese, Filipino, and other oriental workers, and a considerable number of unattached migratory white workers. The relative importance of these groups varied from period to period, and usually they worked as separate groups mingling comparatively little with each other. Although Mexican immigration to the United States had been heavy since 1910, the great influx took place in the decade 1920-1930 when Mexican workers came to constitute an important part of the casual labour force in California.

During the 1930's a markedly different situation arose, particularly in the Pacific Coast states, Arizona, and Idaho. Industrial outlets for new increments of white workers from the high birth-rate areas, particularly Oklahoma, Arkansas, and Texas, have been very limited. Mechanization of farm operations has proceeded rapidly in this same area, and drouth conditions throughout the Great Plains area have been of unprecedented severity. As a result great numbers of destitute families have moved west, mainly by automobile, and have flooded the agricultural areas, especially California, Arizona, Washington, and Oregon, with unassimilated, underemployed hordes of workers. Thus, for the first time, large numbers of white workers travelling in family groups have appeared as migratory casual workers. Since numbers available were markedly in excess of labor needs on the farms, much hardship and many social problems have resulted.

Offsetting this movement in some measure, there has been a significant movement of Mexican workers back to Mexico. The return movement of Mexicans to Mexico occurred mainly during 1930-1933 and has slowed down considerably since then. The significant fact is that north-bound migration of Mexicans into the United States almost ceased after 1930. The principal motivation here,

([1]) While such migratory casual workers are by far the largest group in these areas, the larger farms also employ considerable numbers of skilled and semiskilled workers on a more permanent basis. These include milkers, tractor and truck drivers, mechanics, blacksmiths, etc. Such workers usually receive relatively high wages and are provided with housing facilities and working conditions markedly superior to those of the casual migrant workers

aside from increased competition for jobs in the United States, has been the program of land reform in Mexico which has led Mexican workers to anticipate greater opportunities in their home country.

Somewhat similar migratory groups consisting of various nationalities and races have developed on the Atlantic seaboard, in Texas, and in the sugar-beet areas of the Mountain States. Here, however, the change in conditions and composition of the group has been less dramatic than that of the westward movement from the Southern Plains area.

(4) The *part-time farmer*. There has been a growing tendency over the past two or three decades for families to establish themselves on small plots of land, usually in the vicinity of fairly large cities. These small farms provide a permanent residence, portions of the family food supply, and, in mav cases, some products for sale. Usually they do not provide continuous work for the head of the family, and he secures a main or supplementary income through work in urban industry or by part-time work on larger and more commercialized farms.

Many variations, combinations, and modifications of the above-mentioned categories are found in various parts of the United States. The major groups are, however, embraced roughly within these classifications.

## IV. — Factors affecting agricultural labor.

It is evident that agricultural changes in a country so large and diverse as the United States would vary from region to region, and that any given change would affect different types of farm labor in different ways. Attention will now be given therefore to both general and regional changes in the nation's agriculture [1].

### Changes in agricultural production.

Total production of farm products in the United States has shown a steady upward trend from 1910 to 1931, moving from an index of about 90 in 1910 to around 130 in 1931 (1910-14 = 100). Comparatively little deviation from this trend occured in the 1914-18 period. Total production was somewhat below trend from 1914 through 1919, mainly, however, as a result of low yields rather than from a decrease in inputs. Certain forces were set in motion during this period, however, which had profound effects in the post-war period. Important

[1] Much of the factual material in this section is taken from the excellent article by John D. BLACK and Nora BODDY, "The Agricultural Situation, March, 1940", in *The Review of Economic Statistics* for May, 1940.

among these were the shift to mechanically-powered and larger-capacity farm machinery and a very important change in the export situation for farm products. The first of these not only facilitated the further expansion of total production but resulted in a considerable shift of acreage away from crops used for the feeding of horses and mules. This change had an important effect upon labor requirements in agriculture as will be shown later.

The abrupt change in the export situation affected labor and farm operators in a somewhat different way. Exports had, of course, been at a very high level from 1911 to 1920 except for a sharp decline in 1917. There was a readjustment downward for the period 1921 to 1926 and, beginning in 1926, a rapid decline which did not run its course until 1934. During the war period agricultural exports reached a high of 145 in 1918 (1910-14 = 100). They were in the neighborhood of 120 from 1921 to 1926 and then fell off to 54 in 1934. Since then there has been a small recovery up to 79 in 1937 (1). This level, however, failed to be sustained thereafter. The most important effects of the fall in agricultural exports were in terms of income to farm operators and, indirectly, of reduced wage rates in agriculture. Economic depression in agriculture has a tendency also to affect the amount of labour employed although the more important effect is upon rates of pay.

After 1931 production fell off sharply and did not again reach the level of the 1910 to 1930 trend line until 1937. This decline which carried the index of production from around 130 down to about 115 was a result of several factors. Probably the most important of these was the prolonged and unprecedentedly severe drouth of that period. This affected very severely the major wheat and corn areas. Cotton, general farming, and truck crop areas were less affected. The severe and long-continued general depression of this decade also exerted a depressing effect upon agricultural production though its influence can scarcely be measured because of important counter-effects. Displaced urban workers tended in some measure to return to the land, and in some areas the very pressure of low prices had some tendency to speed mechanization and the operation of larger acreages in the effort to meet fixed charges. A third factor of considerable importance was the production control program initiated by the government in 1933 (2). During all of the period from 1910 to 1940 the trend of production per capita of total United States population was downward, thus indicating a lessening dependence, proportionally at least, upon export markets. The significance of this offsetting factor is declining because of the slowing rate of population growth for the nation as a whole.

(1) Agricultural Statistics, 1939, p. 431. United States Department of Agriculture.

(2) The various factors affecting agricultural production in the United States during the 1930's, particularly the effects of the agricultural adjustment programs, are discussed in considerable detail in « Three Years of the Agricultural Adjustment Administration », by E. G. NOURSE, J. S. DAVIS, and J. D. BLACK. The Brookings Institution, Washington, 1937. The details of this careful analysis are too lengthy for summarization here.

## Changes in gross farm income and farm wage rates.

Gross incomes to farmers over this period have shown great variation, and this in turn has affected markedly the returns to farm wageworkers. The inflation and compelling war-time demands of 1917 to 1920 brought farm incomes to an all-time high in 1919 ($16,364,000,000). This was accompanied by a similar rise in farm wage rates which showed a lag of about one year both on the upswing and the downswing. Gross farm incomes found a new level through the twenties at about 165 per cent. of pre-war but with the severe depression beginning in 1929 dropped well below pre-war and since then have shown fairly rapid recovery to about 140 per cent of pre-war (1) Farm wage rates have followed much the same course but with this difference. From 1920 to 1932 the index of farm wage rates was slightly above that for gross farm income, but in 1932 it dropped below and has remained below it since that time. This is probably due to the tendency for displaced or unassimilated workers to drift into agriculture as an escape when urban work opportunities are unavailable This tendency has resulted in an oversupply of workers in an unorganized labor market and, as a consequence, extreme competition for jobs.

## Mechanization.

Aside from the great depression and the farm income changes just described, large-scale mechanization of agricultural operations has probably been the most important factor affecting the agricultural labor situation in the United States

(1) *Total Gross Farm Income in the United States 1910 1937*

(Millions of dollars)

| | | | |
|---|---|---|---|
| 1910 | 6,546 | 1924 | 10,979 |
| 1911 | 6,140 | 1925 | 11,807 |
| 1912 | 6,590 | 1926 | 11,476 |
| 1913 | 6,815 | 1927 | 11,560 |
| 1914 | 6,875 | 1928 | 11,540 |
| 1915 | 7,105 | 1929 | 11,748 |
| 1916 | 8,665 | 1930 | 9,153 |
| 1917 | 12,561 | 1931 | 6,677 |
| 1918 | 14,941 | 1932 | 5,137 |
| 1919 | 16,364 | 1933 | 5,919 |
| 1920 | 13,169 | 1934 | 6,233 |
| 1921 | 8,562 | 1935 | 7,575 |
| 1922 | 9,444 | 1936 | 8,705 |
| 1923 | 10,330 | 1937 | 9,131 |

Taken from Frederick STRAUSS: « The Composition of Gross Farm Income since the Civil War ». *National Bureau of Economic Research, Bul.* 78. *New York,* April 28, 1940, p. 14.

The changes in man-hours used per unit of output for six of the major crops give possibly the clearest indication of the changes that have occurred in this respect. These changes are not entirely due to mechanization of operations. Some are a result of biological improvements such as higher yielding strains, disease and pest control, and improved techniques of production which are nonmechanical in nature. By far the greatest factor in the recent period, however, has been the introduction of mechanical devices mainly associated with the internal combustion engine. Estimates made by the staff of the National Research Project show the following changes in man-hours required per unit of output (¹).

| | Period | Man-hours | Period | Man-hours | Percentage decrease |
|---|---|---|---|---|---|
| Corn (maize) . . | 1909-13 | 1.09 man-hours per bushel | 1932-36 | 0.90 man-hours per bushel | 17 |
| Potatoes . . . . . | | 0.79 man-hours per bushel | 1934-36 | 0.64 man-hours per bushel | 19 |
| Cotton . . . . . | 1917-21 | 271 man-hours per bale | 1933-36 | 218 man-hours per bale | 20 |
| Sugar beets . . . | 1913-17 | 11.2 man hours per ton | 1933-36 | 8.7 man-hours per ton | 22 |
| Oats . . . . . . . | 1909-13 | 0.42 man-hours per bushel | 1934-36 | 0.27 man-hours per bushel | 36 |
| Wheat . . . . . . | 1909-13 | 0.89 man-hours per bushel | 1934-36 | 0.41 man-hours per bushel | 54 |

It is evident that these figures do not reflect a net effect upon the entire demand for labor as related to agriculture since they represent in part a shift of labor input from the farm to urban industries manufacturing farm equipment. They do reflect, however, the effects upon the labor situation on the farms.

Putting the matter in another way, Mr. Witt Bowden of the United States Bureau of Labor Statistics presents the table shown below (²). These figures reflect not only changes in techniques but also variations in production resulting from weather and other factors. In some cases acreage reductions under the crop control programs have undoubtedly reduced somewhat the effectiveness of farm labor. On the smaller farms, particularly those operated with family labor, the labor force could not be reduced proportionately with reductions in acreages of the crops under the programs.

(¹) U. S. Works Progress Administration, National Research Project. Reports No. A-1 (sugar beets), A-4 (potatoes), A-5 (corn), A-7 (cotton), and A-10 (wheat and oats).

(²) Witt Bowden: « Productivity of Farm Labor ». *Monthly Labor Review*, U. S. Dept. of Labor, Washington, August 1939, table I. p. 32.

*Estimated Changes in Agricultural Production, Employment and Output per Farm Worker, 1909 to 1938.*

(Average 1924-29 = 100.0)

| Year | Production | Number of farm workers | Output per workers | Year | Production | Number of farm workers | Output per worker |
|---|---|---|---|---|---|---|---|
| 1909....... | 78 | 107 5 | 73 | 1924....... | 97 | 100 0 | 97 |
| 1910....... | 82 | 106.9 | 77 | 1925....... | 97 | 100 7 | 96 |
| 1911....... | 85 | 106 0 | 80 | 1926....... | 102 | 101.5 | 100 |
| 1912....... | 90 | 105 9 | 85 | 1927....... | 99 | 99 0 | 200 |
| 1913....... | 84 | 105 9 | 79 | 1928....... | 104 | 99 4 | 105 |
| 1914....... | 92 | 105 6 | 87 | 1929....... | 101 | 99 4 | 102 |
| 1915....... | 89 | 105 4 | 84 | 1930....... | 101 | 98 3 | 103 |
| 1916 ...... | 85 | 105 8 | 80 | 1931....... | 107 | 98 2 | 109 |
| 1917....... | 89 | 103 8 | 86 | 1932....... | 100 | 97 4 | 105 |
| 1918....... | 89 | 99 0 | 90 | 1933... ... | 97 | 97.0 | 100 |
| 1919....... | 87 | 97 7 | 89 | 1934....... | 94 | 95 5 | 98 |
| 1920....... | 91 | 100 0 | 91 | 1935....... | 92 | 98 3 | 94 |
| 1921....... | 83 | 100 4 | 83 | 1936.. .... | 95 | 96 8 | 98 |
| 1922....... | 92 | 100 7 | 92 | 1937 ...... | 109 | 95 3 | 114 |
| 1923....... | 95 | 100 2 | 95 | 1938....... | 104 | 94 6 | 110 |

It will be noted that the index of numbers for farm workers (both hired workers and family workers) shows a decline from 107.5 in 1909 (1924-29 = 100) to 94 6 in 1938. In numbers of workers, full-time basis, this would mean a reduction of some 1,500,000 over the past thirty years.

The significance of the changes in labor requirements per unit of output shown above (p. 290) differs markedly with different crops, and hence in its regional effects. For high labor-using crops, such as cotton or sugar beets, the effect is much more pronounced than for extensive crops like wheat. For cotton it is estimated that labor use has declined from 3,343 million man-hours per year in the period 1907-11 to 2,489 million man-hours per year in the period 1933-36 ([1]). These latter changes have been more recent than some of the others and have reacted with special severity upon certain areas, particularly those cotton areas which are especially suited to the use of large-scale machinery. The adjustment to machinery in the major wheat areas occurred earlier and caused less disturbance For one thing, wheat is a relatively extensive crop, and the casual labor employed on it did not depend exclusively upon employment in this activity. At one time casual workers employed in the wheat harvest were estimated at from 100,000 to 200,000. The wheat harvest began in early June in Texas and, with slight interruptions, moved northward to North Dakota, where it was com-

([1]) See U. S. Works Progress Administration, National Research Project. Report No. A-7 (cotton), by William C. HOLLEY and Lloyd E. ARNOLD. Washington, 1938, p. 103.

pleted by the end of August. Some of the harvest hands followed the harvests north, but the more typical movement was east and west from the centers of labor concentration. The men working in the winter wheat harvest tended to confine themselves to the winter wheat belt, while another large group worked mainly in the spring wheat belt (1). This activity, so far as casual labor was concerned, virtually disappeared during the twenties and early thirties as a result of the general introduction of the combined harvester-thresher. In the same area and farther east, the mechanical corn-picker (maize) reduced materially the demand for casual labor in the late fall months. This change, however, was not so general or so striking as the one in wheat (2).

### Proportional changes in type of agricultural commodities produced.

Another type of adjustment has important implications with respect to farm labor though these are difficult to trace and can only be indicated in broad outline here. The proportions of the various types of farm production to each other have been changing significantly over the past seventy years, and in many cases the trends seem to be so consistent that they may be expected to continue into the future (3). The percentage of gross farm income arising from eggs and poultry shows a fairly consistent increase from 1870 to 1937, having risen during this period from less than 2 per cent to more than 8 per cent. Dairy products likewise show a persistent though slower increase from 10 per cent to about 16 per cent. in the 1930's. Fruits have gained consistently in importance over this period. The same can be said for tobacco though the marked upward trend here dates from about 1915.

On the other hand, cotton, meat animals, wheat, and other staples show either small or rather marked declines in relative importance over the whole seventy-year period. Of these cotton has remained most nearly constant, and wheat has shown the largest decline in importance moving down from more than 12 per cent. of gross farm income in the 1870's to less than 6 per cent. in the 1930's.

It will be noted that the most significant increases in importance are in labor-intensive products while the largest decreases are in labor-extensive products. Of the labor-intensive products, poultry and eggs, and dairy products use chiefly family labor and are produced on relatively small farms. Fruits and

(1) See D. D. LESCOHIER: « Harvest Labor Problems in the Wheat Belt ». *U. S. Dept. Agr. Bul.* No. 1020, April 12, 1922, and « Sources of Supply and Conditions of Employment of Harvest Labor in the Wheat Belt ». *U. S. Dept. Agr. Bul.* No. 1211, May 23, 1924.

(2) A summary of these changes which, in the opinion of this writer, minimizes unduly the significance of the modifications in cotton production is presented by A. P. BRODELL and Robert C. TETRO in an article entitled « Modern Farm Practice and Mechanical Power », in *The Agricultural Situation.* U. S. Dept. of Agr., May 1941, pp. 19-22.

(3) The data on which the statements immediately following are based are drawn from the study by Frederick Strauss, *op. cit.*

vegetables, both of which have been expanding, use large amounts of wage labor. Wheat, which is declining in importance, is no longer a large user of casual wage labor.

## Marketing methods.

Numerous modifications have occurred in the methods of marketing farm products in recent years. Many of these are of considerable interest to students of marketing but do not have great significance from the standpoint of labor ([1]). So far as agricultural wageworkers are concerned, the more important developments appear to be the so-called " Orderly Marketing Program", the " Food Stamp Plan", and the struggle over the inclusion or exclusion from social-security coverage of workers employed in packing houses and other first-handling agencies. The prorate and marketing agreement programs tend either to regulate the timing of shipments or the amounts shipped, or both. In so far as they regulate only timing of shipment, they have some tendency to regularize employment. Where curtailment of total shipments is made to avoid overstocking the markets, amounts of work needed are somewhat reduced.

The " Food-Stamp Plan" provides additional purchasing power to certain low-income groups and is designed both to remove surpluses of farm products and to better the living standards of families eligible to receive these benefits. Eligible recipients, on purchase of orange stamps sold by the government, are given an equal face value in blue stamps which can be used in the purchase of certain types of food or clothing materials which have been certified as being in excess of normal supplies. This aid is extended primarily to recipients of relief and is predominantly urban. In so far as agricultural workers are eligible to receive stamps and do so, the plan improves their incomes. It has no important impact on farm labor otherwise.

At the present time the acts establishing old-age insurance, unemployment insurance, and similar benefits do not apply to agricultural and domestic employees. This has given rise to sharp controversy over the definition of agricultural employment. Litigation has centered particularly around the status of employees in fruit and vegetable packing establishments operated by farmer-owned cooperative marketing associations. If it is decided that these employees are covered under the social security legislation and if farm workers should long remain excluded, it is possible that some of these activities will eventually be shifted back toward the farm and into a less industrialized basis. The advantages of this to the farm operator would, of course, depend on the specific legislation and the administrative rulings under it; also upon the prospect or lack of prospect that farm workers will later be included under the act.

([1]) See, for example, « Significant Current Trends in Marketing », a symposium by F. E. CLARK, H. E. ERDMAN, H. R. TOSDAL, T. N. BECKMAN, P. H. NYSTROM, E. T. GRETHER, L. D. H. WELD, and P. T. CHERINGTON, in *The Journal of Marketing*, American Marketing Association, January 1941, pp. 213-227.

Other important kinds of change have been occurring, some of them significant over most parts of the nation, others chiefly confined to particular regions. In the main, those of the latter type will be discussed in connection with the regions to which they apply.

**Changes in farm tenure.**

One of the broad general changes which has been occurring for more than half a century is a slow but steady increase in the percentage of farms operated by tenants. In the census of 1880, which was the first to show tenure of farm operators, 25.6 per cent of the nation's 4,008,907 farms were listed as being tenant operated. For succeeding enumerations the percentage of farms so held increased as follows:

| | Total number of farms in the United States | Number operated by tenants | Per cent operated by tenants |
|---|---|---|---|
| 1890 | 4,564,641 | 1,294,913 | 28 |
| 1900 | 5,737,372 | 2,024,964 | 35 |
| 1910 | 6,301,502 | 2,354,676 | 37 |
| 1920 | 6,448,343 | 2,454,804 | 38 |
| 1925 | 6,371,640 | 2,462,608 | 38 |
| 1930 | 6,288,648 | 2,664,365 | 42 |
| 1935 | 6,812,350 | 2,865,155 | 42 |

There is some indication that this trend may have run its course and that we may expect a stabilization of percentage of tenancy at something near present levels or even some reduction. The complex of factors relating to these tenure changes cannot be discussed here for want of space In the main, the shift has resulted from rising land values, the disappearance of a pioneer economy where lands were readily available to landless farmers, the impact of depression with attendant loss of owner status by many farmers who were too heavily indebted to withstand the shock, and the pressure for larger operating units growing out of the increased mechanization of farms.

Tenancy is most prevalent in the rich farm lands of the corn belt (Middle West) and in the cotton-producing areas of the South. The growth of corn-belt tenancy has been largely a result of large capital requirements for ownership of farms. In the South much of the tenancy is of a different type and is associated with the institution of cropper-farming. In many regions outside these areas large numbers of farms have passed into the hands of creditor agencies as a result of foreclosure. Operation of these units as tenant farms owned by the creditor agencies may be a temporary phenomenon since most creditor agencies do not wish to continue to hold farm real estate.

In 1937 the federal government passed an act known as the Bankhead-Jones Farm Tenancy Act under which appropriations were made to aid tenants and landless farmers to become owners. Loans are provided at 3 per cent.

interest for forty-year periods and for high percentages of the value of the property. Appropriations made for carrying out the provisions of this act have been to date $125,000,000. Purchases of farms under the act have numbered approximately 20,000. The extensive provision of farm mortgage credit through the federal land banks, established in 1916, was intended as a measure for checking the growth of tenancy. It has had little influence in that direction except for its important contribution in preventing, during the middle thirties, great numbers of farm foreclosures that would otherwise have occurred. Tenancy, while important as an agricultural problem, is not closely related to the farm labor situation in the United States. The tenant-purchase program relates mainly to farm operators rather than to employees and operates mainly to change the tenure position of men who are already in entrepreneurial status. The sçale of application of the act thus far is probably not great enough to offset the trend toward more tenant operation.

The traditional attitude in the United States has been to regard owner-operation of farms as the ideal to be striven for. As a result little attention has been given to the possibility of improving tenure through the regulation of tenancy itself. Consequently tenancy legislation in the United States is at a very rudimentary level compared with that of such a country as England, where tenancy has been more generally accepted as a permanent form of land tenure and where important legislation governing tenancy has been passed. During the past few years the United States government has undertaken a few small-scale experimental developments designed to try out the possibilities of establishing landless farm families as tenants on government-owned cooperative farms. This undertaking is still in the experimental stage.

### Farm indebtedness.

Significant changes have occurred in the debt situation of the farmers of the United States during the period since 1910 when data on farm indebtedness first became available through the United States census. These changes have affected hired farm labor only indirectly but, in view of their important relation to the general situation in agriculture, brief mention of them is made here. Farm mortgage debt in the United States in 1910 amounted to some $3,207,863,000. As a result of the high prices of farm products in 1917, 1918, and 1919, large-scale speculation in farm lands developed, especially in 1919 and early 1920. Land transfers were numerous and at very large increases in price, especially in the most fertile areas of the Middle West. This speculative movement came to an abrupt halt with the drastic declines in prices of products which occurred in late 1920. Farmers were left, however, with a wastly increased mortgage debt which was further augmented by deficit financing during the early twenties. Total farm mortgage debt reached a high of $10,785,621,000 in 1923 (1). Thus despite substantial recovery in the middle

(1) Data from *Agricultural Finance Review*, U. S. Dept. of Agr., Washington, November 1930, p. 14.

and late twenties, the industry was in a peculiarly vulnerable position when the further and more serious depression of the early thirties came on. Many thousands of farms carried short-term mortgages (usually three to five years), at relatively high rates of interest. As these fell due, life insurance companies and other private investors were in many cases unwilling to renew them. Farmer borrowers found themselves in a desperate situation, and wholesale foreclosures appeared in prospect. At this stage the federal government stepped in by reorganizing the federal farm credit agencies and providing additional support for them. Some $2,500,000,000 of farm mortagage debt was transferred to the federal agencies at lower interest rates and on better terms. This action eased the acute situation then existing though many of the more weakly-financed farm owners were forced into liquidation despite a comparatively liberal lending policy on the part of the federal agencies. During the decade of the thirties farm mortgage debt has declined markedly through foreclosure, through adjustments made by creditors, and through repayments by farmers. Total mortgage debt was estimated at $7,070,896,000 in 1939. Short-term obligations had likewise declined from a peak of $3,869,891,000 in 1920 to $763,885,000 in 1936. By 1938 loans of this type had again increased to $1,255,185,000 (1). Throughout the past decade farmers have been under severe financial pressure, and this has been accompanied by equally severe pressure on farm wage rates.

### Changes in consumption habits.

There have also been significant changes in the consumption habits of the American public during the past thirty years. These may be summarized briefly as a decline in the per-capita consumption of wheat and other cereals, potatoes, apples, beef and veal, and tea. There has been considerable increase in the per-capita consumption of vegetables, citrus fruits, sugar, poultry and eggs, fluid milk, other dairy products (especially ice cream), and of edible fats and oils other than lard and butter. Per-capita consumption of chocolate and coffee has likewise been increased (2). These changes represent in the main a shift away from the labor-extensive crops and toward the labor-intensive crops. Many of the labor-intensive crops mentioned are particularly heavy users of migrant casual wage laborers. The trend indicated seems likely to continue into the future.

### Changes in government policy.

The Roosevelt administration which came to power in 1933 initiated large changes in government policy with respect to agriculture. Summarizing all too briefly, these included a substitution of positive planning for laissez-faire, curtailment of production of export crops, heavy subsidies to agriculture, and a marked

(1) Data from *Agricultural Finance Review*, U. S. Dept. of Agr., Washington, May 1939, p. 34.

(2) See "Consumption of Agricultural Products in the United States Studied". *Inside B. A. E.*, U. S. Dept. Agr., Washington, April 1941, p. 5.

emphasis on conservation of the soils. In the main, these programs were not specifically oriented to agricultural wageworkers. Their effects upon the farm laborer were incidental and are generally considered to have been adverse, though conclusive information is difficult to arrive at. To the extent that acreages of important crops have actually been curtailed, employment opportunities in agriculture have been reduced, since fallow or soil-conserving crops substituted are low users of labor. Other federal programs have in part offset the influence just mentioned. Among these are large-scale make-work projects many of which have used actual or potential farm workers. On the strictly agricultural side, the most important decreases in work opportunity resulting from the federal agricultural programs have almost certainly been on the cotton farms of the South. Ham concludes:

" It has thus been impossible to measure with the data at hand the precise effects of the agricultural programs upon farm labor in the Cotton Belt, as elsewhere. However, the nature of their impact is clear. In the South, mechanization is likely to continue. Present prospects in the domestic and export market for cotton hold little promise of any immediate return to a forty million acre cotton crop. Reduction of the number of tenants and wage hands, under these circumstances, seems inevitable " (1).

**National defense program.**

The most recent change in conditions is that resulting from the program of defense preparation. This and the army have been absorbing labor at a very rapid rate during the past year. It seems likely that by the late months of 1941 these activities will have absorbed labor to the extent that serious oversupplies of farm workers will have been eliminated and that there will be moderate shortage in some areas. Hourly wage rates offered have already advanced sharply in the Pacific Coast states. The defense activities, however, draw mainly skilled workers or young workers suitable for training. Much of the labor which has been recently in excess in the agricultural areas is not well suited to defense activities and will probably remain in agricultural work but with better earnings than in the past. When defense activities slack off, seriously excessive supplies of farm labor may again be expected.

## V. — Special problems in agricultural labor.

At least two of the regional situations call for special consideration in order to make the over-all figure intelligible. These are the cotton cropper problem, which is confined almost wholly to the South Central and Southeastern states, and the migrant casual worker problem which is concentrated largely on the Pacific Coast and in the Southwestern states.

(1) William T. HAM: " The Impact of Industrial, Labor, and Agricultural Control Policies Upon Farm Labor ". *Rural Sociology*, Journal of Rural Sociological Society of America, March 1940, pp. 57-58.

### The southern share-cropper.

Cotton and tobacco production developed earliest and most extensively in the southeastern quarter of what is now the United States. Negro slavery which was then permissible in all parts of the young nation, was found much better suited to the extensive hand work required in growing cotton and tobacco than to the more diversified and self-sufficient types of agriculture which prevailed in the northern states. Slavery, and hence Negro population, came to be confined largely to the cotton and tobacco areas. Along with the use of slave labour and the growing of commercial crops, a pattern of land-holding developed which was markedly different from that in the northern states (1). This is known as the plantation system, and its influence upon the agriculture of that region is still evident At the close of the war between the states the area was impoverished and capital very scarce. Much of the land was still held in large units. Nominal owners lacked funds. The former slaves had no experience as independent operators and were accustomed to working under close supervision. A system developed in which workers were assigned small tracts of land which they planted to cotton under the direct supervision of the landowner or his representative. Tools, seed, mule power, and similar items were usually provided by the landowner. These croppers supplied only the manual labor and received in return a share of the crop Many of the landless whites fell into this same category and came to operate small plots on virtually the same basis as the former slaves.

This system of operation has continued with little modification up to recent times and still prevails over wide areas. During the past two decades, however, and especially since 1930, important changes have occurred. The use of tractors and the operation of larger units have become prevalent, especially in the delta lands of the Mississippi and farther west. Cotton-picking, the operation requiring largest amounts of labor, has continued to be a hand operation. The labor demand has become more seasonal, and there has been considerable tendency to shift from a share-payment to a piece-work wage basis. Many former croppers have been crowded off the land and have become unstabilized wageworkers with only short-period casual work available to them. Their condition is generally considered to have deteriorated since their money incomes are very low and some of the perquisites formerly available to them, such as cabins, firewood, and some minor items of living, are less generally supplied by the landowners than in former time.

Other influences have also been at work. Under the government's crop-control and farm relief programs heavy subsidies have been paid to farm operators. Since croppers are regarded legally as tenants, the federal agencies have sought to force the sharing of such subsidies with the croppers. This has created

(1) See, for example, fuller discussion by Rupert B. VANCE in: Human Factors in Cotton Culture. University of North Carolina Press, Chapel Hill, 1929.

considerable incentive for landowners to operate their lands with wage labor instead of using the cropper system. In the sugar-cane areas the rapid mechanization of the industry has also operated to shift farming in the direction of large operating units using wage labor and to decrease the number of workers employed.

### The western migrant casual worker.

In the western part of the cotton region, notably Texas, Oklahoma, and Arkansas, these displacements have caused large numbers of white croppers to trek westward seeking employment in the fruit, vegetable, and cotton area of the West, especially those in California and Arizona This movement assumed very large proportions in the 1930's. Available workers in these areas greatly exceeded numbers needed, and deplorable social and economic conditions resulted.

Other factors stimulating this huge westward migration were the drouth conditions which prevailed over much of the Great Plains area, forcing farmers off their land because of inability to grow crops, and the high birth-rates prevailing in the areas of origin. Thousands of young workers were coming to maturity but were unable to find work opportunities in their native areas or in the economically depressed industrial sections of the country. They likewise tended to join in the westward movement.

### Large-scale farming.

In the Pacific Coast states, particularly in California, where the problem of heavy in-migration appeared in its most aggravated form, agricultural operations have likewise been undergoing considerable change. Under the Spanish and Mexican regimes prior to 1850, this area consisted in the main of huge land grants operated on the most extensive basis conceivable. Cattle ranching was almost the sole occupation, and some of the holdings were enormous. After 1850, as a result of rapid settlement by people from farther east, these holdings were rapidly broken up, and California now has thousands of very small irrigated farms. The remnants of many of the large holdings still exist, however, and in many cases these have been brought under irrigation and converted to very intensive highly industrialized types of farming. Some of them employ hundreds of wageworkers, especially in peak seasons.

Other very considerable combinations of land into large units for operation have occurred through large-scale rental of individual units. This condition prevails especially in certain of the vegetable and cotton growing areas In the production of vegetables, especially head lettuce, asparagus, and similar crops, grower-shipper operators renting and owning large acreages are common. This pattern of operation is partly an adjustment to marketing problems. The principal markets for these products are thousand of miles distant. The small operator cannot sell effectively except through a large and highly-developed cooperative organization While such cooperatives have developed extensively

in the fruit and poultry industries, they have been negligible in the vegetable industry Hence the large shipper has had far better outlets for his product than has his small-scale competitor. These large shippers buy from smaller growers, but more and more they have tended to acquire control of land, largely through lease, and to produce their own supplies by means of hired labor. This system affords some advantages not only from vertical integration of marketing and growing activities but also from improved standardization of product and similar factors The social effects as regards the condition of labor have often been very bad.

The other principal areas of large-scale leasing and operation are in cotton production, especially in the San Joaquin Valley of California and in Arizona. Here the advantages do not arise principally from superior market outlets but rather from features of the production technique. Irrigation in the principal cotton-growing areas of California is largely by means of very deep wells. These involve large investment and are ill-suited to small-scale development except through a much more developed system of cooperation than now exists The advantages of very large mechanical units are also very pronounced and large-scale mechanized operation has perhaps reached the most extreme form that is to be found anywhere in the world.

These large-scale units whether resulting from an earlier pattern of land ownership, from advantages of large-scale integrated marketing, or from advantages in mechanization and financing, have created many difficult and serious problems in labor relations and social conditions Workers have no continuous tenure in relation to any given farm. Their work is highly seasonal, and involves not only a great amount of idle time, but much moving about in search of work and from job to job. In the more recently developed sections, as in cotton, housing facilities are very inadequate, and even in the older producing areas housing problems are difficult of solution because of the very short periods of residence on any one farm or even in any one community. These features, together with excessive numbers of workers, low returns to farmers, low wages, and limited work opportunities, have created many difficult and perplexing problems which are now receiving much study and thought on the part of the various governmental and private agencies.

## VI. — Summary.

With this general picture of changing United States conditions as a background, the effects upon farm labor can be sketched in broad outlines In brief they appear to be about as follows:

(1) Numbers employed. Total numbers of persons employed in United States agriculture have declined from 12,209,000 in 1909 to 10,997,000 in 1936, or from an index of 107 (1924-29 = 100) to 97. In this same period family workers employed have declined from 9,341,000 to 8,502,000, the index change being from 111 to 101. Hired workers declined from 2,868,000 to 2,494,000, an index change from 97 to 85. Numbers of hired workers were at relatively high levels

between 1914 and 1918 and again between 1925 and 1930. Numbers of family workers were at their highest levels in the period 1909 to 1915 ([1]).

(2) Agricultural workers tended to be available in adequate to somewhat excessive numbers up to 1930. From 1930 on there has been a large excess of workers seeking employment in agriculture, especially in the Pacific Coast states, in the South, and along the East Coast This situation has come about through displacements resulting from increased mechanization of farms, serious drouths in the Great Plains area, rapid accumulations of young workers not previously employed, and widespread depression and underemployment in industrial areas. These conditions have given rise to large migratory movements, particulary from the South Central and Plains states into the Pacific Coast states and Arizona The areas of origin, particularly Oklahoma, Texas, and Arkansas, had been for many years under severe population pressure, but such pressures had not been sufficient to overcome the immobility of these populations The severity of conditions in these areas during the past decade touched off a mass migration which apparently was a potentiality even before the period in which it actually occurred ([2]).

(3) Excessive numbers of workers in proportion to labor needs have resulted in sharp competition for jobs, low rates of pay, and serious underemployment through failure to get jobs and through excessive spreading of limited amounts of employment. As a result such families have found it necessary to continue to migrate in search of employment, have been able to work only a few months per year, and have suffered much hardship.

(4) The greatly increased volume of employment resulting from defense activities and military expansion has in considerable measure absorbed the excess labor force temporarily. A recurrence of serious underemployment may be expected when demobilization and slacking off of defense activity occur.

(5) The United States government and various research agencies are giving far more attention to farm labor problems than in the past, and relatively aggressive programs of amelioration seem in prospect As yet such programs are largely in the discussion and exploratory stage.

([1]) Data from U. S. Works Progress Administration, National Research Project Report No. A-8 (Trends in Employment in Agriculture, 1909-1936), by Eldon SHAW and John A. HOPKINS. Washington, November 1938, p. 11

([2]) The net loss to the rural population of these three states through migration in 1920-1930 was 786,000 persons. See U. S. Works Progress Administration, National Research Monograph XIX (Rural Migration in the United States), by C. E. LIVELY and Conrad TAEUBER. Washington, 1939, p. 139.

# *INTERNATIONAL CHRONICLE OF AGRICULTURE*

## GERMANY

### Introduction.

Since the autumn of 1939 the economic life of Germany has been entirely conditioned by the war. All agricultural activities have been placed at the service of wartime food requirements. The rapidity with which the measures called for by these needs have been carried out has only been made possible by the fact that the Reich Minister for Food and Agriculture, and Leader of the German Farmers, Walter Darré, had already planned the whole structure of the country's food economy on uniform lines designed to assure the production of the crops required for feeding the nation. Moreover, in regulating the markets he had created an organisation equally well suited for meeting the needs of war and of peace. The fact that all foods were immediately rationed allowed of the parcimonious use of available supplies and has assured the nation's food requirements however long the war may last. Nor was any time lost in taking measures for avoiding the decrease of production. Thanks to all this, production can at all times be adjusted to meet special needs as they make themselves felt.

Since the war began it has, with few exceptions, always been possible to distribute the same rations. During the summer of the second year the meat ration had to be reduced so as to avoid depleting the number of cattle which, since the opening of hostilities, has remained practically stationary. The strictest measures taken have been those for regulating the supply of fats. Butter has gradually replaced other fats. The consumption of wheat flour has also been restricted and it has been replaced to some extent by rye flour. The consumption of potatoes and vegetables has increased very considerably.

Thanks to the strict regulation of production and consumption, and above all thanks to the uniform market regulations and to the system of price fixing, the cost of living has only risen within narrow limits. From the beginning of the war down to the end of 1940 the increase did not exceed 2.7 per cent. This is accounted for by the rationing of all essential foods and by the comprehensive system of price formation and control previously introduced. The food index-number rose from 100 in 1913-14 to 122.8 in 1939 and 127.6 in 1940. The cost of living index-number rose from 126.4 in 1939 to 130.1 in 1940. During the first quarter of 1941 there has been no change in the prices of first necessaries. The slight rise in the cost of food during this period was accounted for by seasonal causes. The index-numbers do not however reflect this change, as, owing to changed conditions of supply, consumption had turned to others, and in part more expensive foodstuffs.

In spite of the war, national-socialist agrarian policies have been systematically pursued. They aim at the formation of a new German peasantry, at the enlargement of the area under cultivation, and at land improvements. Measures have been planned and are now being carried out for providing, in the reconstructed villages in the western area of the Reich, rural dwellings which, in so far as country conditions permit, shall afford the peasantry the comforts and technical improvements available in the towns; the number of cultivated lots will be reduced and the size of those remaining will be enlarged, and it will thus be possible after the war to reorganise rural life and to raise the remuneration of agricultural work.

## Agriculture before the war.

*The agricultural population.* — The census of May 17 1939 returned the population of the Reich at 78,072,000 persons, of whom 14,882,000 or 19.1 per cent., were dependent on agriculture and forestry for their living. Of these 6,730,000 were male and 8,152,000 female. In the occupational census the agricultural population ranked second, the first place being held by the population dependent on industries and handicrafts for a living. These accounted for some 31 5 million persons. The number actively engaged in agriculture and forestry stood at 10,840,700 of whom 4,902,700 men and 5,938,000 women. Classification shows that 2,426,300 of these were independent farmers, 2,532,500 laborers, 109,100 salaried employees, and 5,772,800 members of peasant families working on the farm The high ratio of this latter class (53.4 per cent.) shows that German agriculture is mainly based upon the family farm.

*Grouping of farms by size* — The grouping of German farm and forest holdings by size was made by the agricultural and forestry census. The returns show that they mostly belong to the class of small peasant holdings which accounts for 34.4 per cent. of the 3,900,836 farm and forest holdings existing in the Reich. There are 1,341,600 such holdings averaging from 5 to 6 hectares each. The size of these holdings is generally such as to afford a subsistence for a peasant family. They are worked as a rule by the farmers, who are generally peasants, assisted by the members of their family without hired labour The farm and forest holdings of Germany are classified by size as follows:

| | | | |
|---|---|---|---|
| 0 5 — 2 hectares | . . . . . . . . . . . | 1,155,000 estates | 29 6 per cent. |
| 2 — 5 » | . . . . . . . . . . . | 944,200 » | 24 2 » » |
| 5 — 20 » | . . . . . . . . . . . | 1,341,600 » | 34.4 » » |
| 20 — 100 » | . . . . . . . . . . . | 418,400 » | 10 8 » » |
| 100 ha and more | . . . . . . . . . . | 41,611 » | 1 » » |

*Land uses* - Of the 53 5 million hectares of land represented by holdings of 0.5 ha. and over, 33,041,940 ha , i e. 62 per cent. were under crops in May 1939 Forests occupied a large part of the remaining area, and only a small percentage was occupied by houses, courtyards, parks, roads, waste land and water. The cultivated land was distributed as follows arable land 21,522,000 ha. (65 per cent.), permanent grass and artificial meadows 6,774,000 ha. (20.5 per cent.), grazing lands 4,085,000 ha. (12.4 per cent.), market gardens 539,000 ha , (1,6 per cent.), vineyards 113,000 ha. (0 3 per cent.). In July 1939 the arable land was distributed as follows rye 4,670,169 ha. (21 7 per cent.), wheat 2,411,170 ha (11,2 per cent.), autumn barley 434,377 ha. (2 per cent.), spring barley 1,468,712 ha. (6,8 per cent.), oats 3,330,909 ha. (15 per cent.), maize 105,848 ha. (0,2 per cent.), flax 57,533 ha. (0.3 per cent.), pulse 362,782 ha. (1.7 per cent.), vegetables grown in the fields 113,752 ha. (0.5 per cent.), lucern, clover, and other forage crops 3,023,755 ha. (14 per cent ); 122,263 ha. (0.6 per cent) was fallow. 72 per cent. of all cereal crops are raised on peasant holdings of from 5 to 100 ha. which account fore 70 per cent. of the arable land. Thus the share of cereals raised on these holdings is rather higher than the share of the arable land for which they account. Peasant holdings also assign a large place to forage crops which account for 75 per cent. of the arable land: 61 and 51 per cent. of the lands belonging to these holdings are sown respectively to potatoes and sugar beets.

*The use of agricultural machinery.* — The farm census also contains data concerning the mechanisation of agriculture. It registered a total of 1,804,845 electric motors of which 1,278,960 of 1 to 6 hp each, 11,755 steam engines, 145,936 petrol motors, 63,160 crude oil and gas engines, 68,968 tractors, motor mowers, and small straw and chaff choppers, 806,410 seaders, 233,437 fertiliser distributors, 200,254 cultivators, 397,321 winnowers, 1,675,206 harvesting and mowing machines, 458,528 potatoe pickers, 973,034 threshing machines, 2,017,386 forage cutters, 108,087 waggons with rubber tyres, etc. Besides these, the farmes use machines, more especially threshing machines, belonging to cooperative societies and taken on hire. On an average 161 farms use 100 threshing machines. Generally speaking, the figures for agricultural machinery are highest in the districts were peasant holdings are most numerous, in the districts were large estates are the rule the ratio of machines to the number of estates is indeed high, but the total number is lower than in the districts were peasant holdings prevail.

## The organisation of the supply and the marketing of food in wartime.

With a view to avoiding friction and securing the best results in wartime, measures were taken immediately on the outbreak of hostilities for reorganising and unifying the offices of the agricultural administration and of the *Reichsnahrstand*. All matters relating to food economy—production, processing and marketing of foods - were placed under the Food offices which have two sections, and which, in conformity with the policies laid down by the Reich Minister of Food and Agriculture, are the supreme organs for dealing with all matters relating to food. Section *A* is formed by the Corporation of Food and Agriculture, section *B* by the qualified administrative officers. The Director of the regional and provincial food offices, which have been opened under the care of the higher administrative authorities, is the regional Leader of the peasantry; he is also at the head of Section *A*, while the director of Section *B* is appointed by the administrative authority. Similar arrangements hold good for the district Leader of peasantry who is qualified to act for the administrative district to which the respective food office belongs. He is the director of the food office for the urban or rural district and is also director of Section *A* of that district. The regional Leader of the peasantry (for the *Land* or for the province) and the district chief of peasantry, with their assistants, are held responsible for the success of the food supply services. They must not only regulate the sale to consumers, but they are above all required to take steps to ensure the upkeep of production and its increase to the fullest extent possible, and to see that the whole amounts produced are made available.

## The use made of food stuffs and forage by the authorities.

The systematic and complete supply of foodstuffs and forage to the population is regulated by the decree of 27th August 1939 (*Reichsgesetzblatt* RGBl. p. 1521, *Verkundigungsblatt des Reichsnahrstandes*, RNVBl. p. 635) which deals with the use to be made of agricultural products by the authorities. Under this decree, the Reich Minister for Food and Agriculture issued on 7th September 1939 nine decrees regulating the use to be made by the authorities of certain foodstuffs, i. e. · (1) cereals and forage (RGBl. p. 1705); (2) animals and animal products (RGBl. p. 1714); (3) milk, dairy products, oils and fats (RGBl. p. 1719), (4) potatoes and their bye-products (RGBl. p. 1727); (5) sugar beets, sugar, and other products obtained from sugar beets (RGBl. p. 1728); (6) jams and other preserves to spread on bread, table onions and spices (RGBl. p. 1731); (7) eggs and their bye-products (RGBl. p. 1732); (8) raw cocoa and confectionery (RGBl. p. 1735);

(9) the regulation of the supply of fish and fish preserves by the German Fisheries Federation (RGBl. p. 1734). There were also issued a circular by the Reich Minister for Food and Agriculture regulating meals served in restaurants, a decree of 16th September 1939 (RGBl. p. 1825) dealing with supplementary rations allowed persons engaged on heavy work, expectant mothers, nursing mothers, and aged and infirm persons; a decree on the regulation of the market for cereals, pulse, and forage, and a decree of 16th September 1939 on the processing and use of margarine. A decree of 18th October 1939 regulates the use of seeds, and on 25th September 1939 a decree was issued regulating the distraint and pledging of agricultural products. These several decrees afford the basis for corresponding measures taken by the National Federation of Producers and Traders in cereals, forage, milk and fats, cattle, eggs, potatoes, fruit and vegetables, sugar and confectionery. They have from time to time been supplemented and revised to meet the economic situation and conditions affecting supplies, and there the position of each branch of the food supply is made quite clear.

Since the outbreak of hostilities, food-cards have been issued which allow of an equitable and uniform distribution of all essential foodstuffs. Each consumer knows the ration to which he is entitled, and he is guaranteed the amount assigned him Rations have been fixed on the basis of national output, this makes it possible to assure the supply of food required by the nation even if the war should be prolonged. The introduction of rationing was facilitated by the possession of ample statistical data not only on the production but also on the consumption of foodstuffs. The rationing cards are distributed for four weeks at a time, and deal with the following products meat and meat products, bread and flour, milk and dairy products, oils and fats, eggs, sugar, jams, meals, semolina, sago, and other groceries, coffee and coffee substitutes, tea and cocoa.

Some restrictions have also been placed on the consumption of the agricultural population. The decree issued by the Reich Minister of Food and Agriculture on 14th November 1939 summarises all the measures taken at that date relating to consumption by the agricultural population of the foods they raise. Respect of the rationing regulations is assured by the rules issued on 6th April 1940 dealing with the regulation of consumption.

## Agricultural marketing policies.

Thanks to the experience previously acquired in the regulation of markets, there was no need of introducing fundamentally new policies on this matter for the duration of the war. All that had to be done was to fix the relations between the consumer and the retail dealer by the issue of food-cards.

Market movements have been affected more especially by the new decrees issued for their supervision and control, broadly modelled on those already in force and supplemented by measures taken each year for adjusting the markets to current conditions. The great need has been to ensure the uniform distribution of farm products throughout the Reich, and for this purpose due consideration has always been given to the economic situation of the moment. The rationalisation of the goods traffic has done much to relieve congestion in the transport services. Prices have only been raised in special cases with a view to encouraging production (milk and butter), or when a higher average price was required to offset the rise in the cost of labor (pig-breeding). The prices of staple foods have been kept at their pre-war level. The rise in the prices paid for fruit and vegetables has not entailed any marked rise in the food expenditure of consumers as rationing has limited the outlay of staple foods.

*Cereals and forage.* — The order issued on 30th August 1939 by the National Federation of German Producers and Traders in Cereals and Forage, requires producers of cereals (including maize), pulse, hay and straw, to deliver all the quantities produced, with the exception of those required for their own consumption, for which the producer is allowed to keep back an amount equivalent to the rations to which he is entitled. The rules regulating the milling of flour have been modified to adjust the degree of extraction more closely to the available supplies of wheat, it has thus been brought to the level in use in other European countries As regards forage, the regional Federations of Producers and Traders in Cereals have been authorised to lay down rules regulating the relations between the retail-dealers and the producers so as to make it easier for the farmers to secure the forage they require.

*Potatoes.* -- Under the order issued on 23rd September 1939 by the National Federation of Producers and Traders in Potatoes, the producer may either market his potatoes in the district where they are grown, or he may sell them to outside consumers, or to authorised dealers. Seed-potatoes may be used by the growers on their own farms, or they be supplied direct to other potatoe-growers within the district served by the local peasant's organisation. Similar arrangements hold good for potatoes used as forage.

*Live-stock for the meat market.* -- The improvements introduced in 1939 into the rules regulating the marketing of hogs reduced the distances they travel from the farm to the market and considerably simplified the shipments As in previous years, so again contracts for delivery proved very valuable in increasing available market supplies of hogs during those weeks when they are usually very low

Since 23rd September 1940 the basic price for certain qualities of hogs delivered to the market has been raised, this has not however affected the price paid by the consumer for pork. The market price of hogs assigned to the slaughter-houses has been raised by an order of 16th April 1941 by 3 Rm. per 50 kgs live weight because the period of fattening has been considerably prolonged, thus raising the expenditure on forage. So as to make it possible to make this increase without altering the retail price of pork the slaughter-house tax has been reduced by 6 Rm. per head i e from 8 Rm. to 2 on the hogs delivered to the commercial slaughter-houses Similarly, the higher price of oxen fixed for the summer of 1941 has been offset by a reduction of the tax on the slaughter of each animal

*Horses.* — An order issued by the Reich Leader of Peasants (RNVBl No. 17 of 20th February 1940) places the sale of draught horses under marketing regulations, and another order regulates the sale of horses bred for the market. In conformity with these orders, maxima prices have been fixed for draught horses, a horse-card is issued for each sale, and a certificate of urgent need is required in order to purchase a horse.

*Milk and fats.* — Since 11th March 1940 the price of whole milk has been raised by 2 pfennigs per litre, and therefore the price of butter has been raised by 20 pfennigs per lb. These higher prices have contributed in a marked degree to increase the output of milk and consequently also that of butter. Uniform regulations, valid throughout the Reich, for German standard butter and for the best quality of German dairy butter, are contained in orders No. 52 and 53 issued by the National Federation of Producers and Traders in Milk and Fats. The new arrangements allow butter to be made from sweet cream.

The regulation of the production and trade in oil seeds and fruits has been entrusted to the National Federation of Producers and Traders in German Milk and Fats (RNVBl. No. 52 of 28th June 1940). As the tax on fats which had been levied until then was repealed, and as the price of edible oils has been fixed on new lines since

1st July 1940, the premium previously given for processing oil seeds and fruits is no longer paid. In September 1940 the National Federation of Producers and Traders in German Cereals and Forage regulated the prices of pulse, fixing maxima prices for sales made by the producers and limiting the margin of profit which traders at the different stages of marketing are authorised to charge, prices have there been fixed, beginning with those paid to the producer and finishing with those paid by the consumer.

*Eggs.* — The National Federation of Producers and Traders in Eggs issued an order on 10th February 1941 for the stricter regulation of the egg market. The Associations of Producers and Traders in Eggs have been authorised to fix, in their respective districts, the number of eggs the poultry farms must deliver to them. In fixing these quantities one and a half hens or ducks are set aside for the needs of each person occupied on the poultry farm. The number of eggs to be delivered on account of the remaining hens and ducks during the laying year, which runs from 1st October 1940 to 30th September 1941, may be fixed as high as 60 eggs per hen or duck As a rule the numbers to be delivered are first fixed for the urban and rural districts As a rule the delivery of the eggs laid in urban districts is not insisted on, in their case only large poultry farms are required to deliver their eggs.

## Agricultural production policies.

*The direction given to production* - Thanks to the direction which had been given to the agricultural production campaign in previous years, the war has not called for fundamental changes on the farms The chief purposes aimed at by the production campaign and the tasks assigned in war time, may be summed up as follows (1) larger crops, (2) the extension or at least the maintenance of the area under root crops, (3) the increase of the forage crops raised on the farms (catch crops, silos, lucerne grass, rational use of grazing lands, maize, etc ); (4) the intensified cultivation of oil plants; (5) the increase of the acreage under oats, (6) healthy and productive cattle fed on forage grown on the farm, (7) the development and stabilisation of the dairy industry, (8) increased attention to the importance of farm-yard animals, orchards, market gardening, edible lupins, measures for plant protection and selection, etc.

*Farm Labour.* — The difficulty experienced in securing workers for the farms during war time, has been overcome by employing foreign labourers and by using prisoners of war. During the busiest season, the voluntary services rendered by townspeople during the week-end and vacations, and the " harvest service " of the Hitler Youth have also been of great value.

*Measures taken to assure the cultivation of the land.* — To assure the cultivation of the land, the Reich Minister of Food and Agriculture issued a decree on 10th April 1941 (Lw RMBl. - *Landwirtschaftliches Reichsministerialblatt*, No. 18) laying down measures for the current year. In those cases when it seemed doubtful whether the land would be cultivated, measures were taken for the appointment of a reliable inspector or trustee, or else for leasing the farm. This decree also contained measures relating to the assistance which neighbours must give each other and for the application of the Reich law on compulsory work.

*Use of farm machinery and tractors.* — Very important measures have been taken to ensure the use of agricultural machinery and farm tractors. In the autumn of 1940 the *Reichsnährstand* required that all orders for the repair of agricultural machinery

and implements should be given not later than 15th December of that year. On 24th November 1939 the Reich Leader of the German Peasantry issued, through his subordinate services, a special regulation requiring that the tractors used on the farms be reserved exclusively for that purpose. The regulation also fixed the official charge for the use in common of tractors. Rural schools for training agricultural machine drivers organised eight-day courses for tractor drivers.

In December 1940 a special committee was appointed for the standardization of agricultural machinery. On 29th December 1939 an order issued by the Reich Commissary on Price Formation came into force regulating the prices of agricultural machinery and implements and the margins of profit allowed in the trade in same. This order empowers the directors of the groups for the organisation of industrial economy and the national federations of guilds, and the director of the National Federation of Raiffeisen Cooperative Societies to fix the margins of profit, the commissions, and the conditions of payment and delivery to their members and to the members of guilds and cooperative societies dealing in agricultural machinery and implements. They can also fix the prices and conditions of payment of second-hand agricultural machinery and implements

*Supply of fertilisers.* — The fertilisers required to maintain the level of production have been supplied in adequate quantities. Some 700,000 tons of pure nitrogen were available. During the agricultural year 1939-40 the same quantities of nitrogen and potash were distributed as in 1938-39, when consumption reached a maximum. The deliveries of phosphoric acid amounted to 60 per cent. of those of the previous year The quantities of fertilisers supplied in 1940-41 have, as a rule, been the same as those of the previous year. In the autumn of 1940 the rules regulating the prices of lime were revised, and all the lime required for agricultural purposes had to be sold at a uniform price, whether shipped on the main or secondary lines, or by road or rail.

*Soil study activities.* — As an accurate knowledge of the composition of the soil is required in order to secure the best results from the use of chemical fertilisers, the Reich Leader of Peasantry in October 1940 instructed the Federation of German Agricultural Institutes for Soil Science to take immediate action for the study of the soil. On each thousand hectares of farm land 250 samples were taken. It has thus been possible to direct systematically the distribution of fertilisers. On 27th March 1940 the Reich Minister for Food and Agriculture issued an order which provides the legal basis for this action, and money grants made by the Reich facilitate its execution

*Stock-breeding.* — On 26th March 1940 the Reich Minister for Food and Agriculture issued regulations for the application of the First Decree for the Encouragement of Stock-Breeding issued on 26th May 1936, and called attention to the duty of making a systematic endeavor to secure all the purposes which the Reich law on cattle-breeding has in view. The most important measure for improving the yields of milk or meat obtained from cattle is the use of approved breeding stock. The Food Offices have been advised to encourage and assist the cattle judging Commissions in the work they are doing for improving stock-breeding. The Reich Minister for Food and Agriculture issued on 28th May 1940 an order fixing the minima yields required of approved bulls, the heifers that calved them must give a certain annual minimum yield of milk, taking into account all the periods of lactation. To encourage the breeding of farmyard animals the Reich Minister for Food and Agriculture issued on 29th May a regulation fixing the minima requirements for approved goats. An effort is being made to increase the herds of goats and the yield of milk by making grants for the purchase of

young male goats of approved breeds. Sheep-breeding is also encouraged by the grant of loans at 2.2 per cent. interest for the purchase of stock; these loans are repayable within a period of ten years out of the receipts obtained from the sale of wool.

*The milk campaign.* — With a view to increasing the yield of milk, which can only be secured by heavier costs on the farm, the price of milk was raised on 27th February 1940 by 2 pfennigs per litre, and the price of butter by 20 pfennigs per lb. The Reich Minister for Food and Agriculture gave orders for organising a milk "campaign", and opened a competition for increasing the production of butter by limiting the consumption of whole milk on the farm and using more for making butter. Thanks to these measures the output of butter in 1940 exceeded by 55 per cent the average for the five-year period 1928-32. In 1940 the supply of milk exceeded by some 2,500 million litres that obtained in 1938. In the first months of 1941 the supply of milk again exceeded by 4 to 7 per cent. the figure for 1940. Taking into account the area covered by the Reich and the number of head of cattle it possesses, Germany is now the greatest butter-producing country in the world. In 1940 German dairies produced some 600,000 tons of butter, if we add to this the quantities of butter made on the farms the total output stands at some 700,000 tons.

*The increased cultivation of oil-seeds.* — It is hardly possible to increase the German output of fats unless the output of vegetable oils used in the manufacture of margarine be increased. In 1940 some 200,000 ha. of land were under colza, an area nearly three times that under oil-plants in 1939. In 1941 the area under oil-seed crops will be raised to 300,000 ha. The growing of oil-plants is promoted by delivery contracts for colza and rape. The price of oil-seeds has been raised for the 1941 crop to 44 Rm. per quintal, following on a rise from 32 to 40 Rm. made in the previous year. This price is paid when the colza and rape seed are supplied under a contract for cultivation and delivery.

*The number of cattle and meat consumption.* — The success achieved by the German dairy industry would not have been possible if in 1939 a successful effort had not been made to offset by more intensive stock-breeding the reduction in the number of head of cattle due to foot and mouth disease. On 4th December 1939 the number of head of cattle stood at 23.9 million, of which 11.9 million were milch cows.

At the same date the number of hogs was estimated at 29.1 million. Pork accounts on an average for 60 per cent. of the meat consumed in Germany and lard for one third of the edible fats. The lighter weight of the animals slaughtered, which has been one of the consequences of price regulation, has accelerated the disposal of the hogs and has adjusted their number to the available supplies of fodder. The bumper harvest of root crops obtained in 1940 made it again possible to raise the number of hogs by rearing more sucking-pigs.

*Increased fodder supplies.* — A series of measures have been taken for increasing the supply of fodder and the use of fertilisers suited to that purpose. Thus the Reich has made grants for: (1) raising the yield of grass-lands and converting unprofitable grass-lands into arable lands (these grants include one for using unprofitable permanent grass-lands for raising potatoes and oil or fibre plants); (2) erecting plants for drying green forage; (3) erecting silos; (4) organising bodies of workers to steam potatoes; (5) making manure pits and liquid manure pits. All these measures were given effect in 1941. The intensive cultivation of tubers and root crops is of great importance. In 1939 some 56.3 million tons of potatoes and 39.5 million tons of mangold-wurzels were grown. The encouragement given in recent years to the construction of silos for potatoes, and the increased number of workers available for steaming the

potatoes, has made it possible to use them for forage under the best conditions. Moreover, the quantities of seed-potatoes which can be produced has been greatly increased.

In 1941 it has been possible to supply 15 million quintals of approved seed potatoes to farmers. The potatoe crop is protected by measures taken for the control of the Colorado beetle pest.

Farmers are encouraged to increase the acreage under sugar-beets by allowing them in addition to the sugar which is part of the wages paid in kind to the farm labourers, a premium of 2 5 kgs of sugar or 5 kgs of beet-juice, for each quarter hectare of land under beets. The labourers also share in this premium.

To secure the construction of silos for use by the peasants, a grant of 10 RM. for each c. meter built has been made over the period from 1st April 1940 to 31st March 1041 throughout the Reich.

To secure the more extensive use of barley for fattening pigs the barley content of brewers' malt has been fixed since 30 November 1930 at 9-10.3 per cent.; this has allowed of a saving of some 500,000 tons of barley. An order of 15th January 1940 requires the delivery of brewery waste used as fodder.

*The extension of the area assigned to market-garden crops.* — To meet the greatly increased demand for vegetables, an effort has been made to encourage market-gardening and the raising of vegetables on the arable land. The area planted to hops has been reduced 15 per cent. in favour of market gardens (Order of the Federation of German Brewers, 9th March 1940), and new rules have been made regulating contracts for production and delivery (Order of the Federation of German Market Gardeners, 10th March, 1941). Delivery contracts which assure the marketing of the entire crop have also given very good results in increasing the production of market-garden crops. Measures have also been taken to encourage workers to make and cultivate market-gardens and for promoting the cultivation of vegetables in other small private gardens.

The Reich continues to make grants to encourage the planting of fruit trees; grants are not paid for regrafting fruit-trees so as to secure finer varieties of fruit, as such treatment reduces the yield of the trees for several years. Grants are also made for mulberry-tree plantations.

*The crops.* — The results secured by the "production campaign" are shown by the heavier crop yields. In 1939 record crops were harvested. No less than 27.43 million tons of cereals were harvested, of which 15.05 million were bread cereals and 11.07 autumn barley. The potatoe crop of that same year amounted to 56.3 million tons; 17.4 million tons of sugar-beets and 39.5 million tons of mangoldwurzels were obtained. The tubers and root crops obtained in 1940 were still larger: Greater Germany, inclusive of the Eastern territories recently reconquered, produced 70 million tons of late potatoes, 20.8 million tons of sugar-beets, and 46.3 million tons of mangoldwurzels, in addition to 28.6 million tons of cereals.

*The value of the agricultural production.* — The increase of production is clearly shown by the reports published by the Institute for the Study of the Economic Situation (*Institut fur Konjunkturforschung*) on the value of German agricultural production and on the income obtained from its sale. The value has risen from 8.57 milliard RM. in the crop year 1932-33 to 14.05 milliard RM. in 1938-39 and to 14.07 milliard in 1939-40, thus for the first time exceeding the record figure secured in 1928-29, although prices in 1939 were 22 per cent. below the level at which they stood in 1928-29.

The heavier returns from the sales were therefore due, above all, to the larger quantities sold. Market sales in 1939-40 exceeded the 1928-29 figures by more than 23 per cent. The value of agricultural products sold in 1938-39 stood at 10.7 milliard RM. and in 1939-40 at 10.9 milliard RM as against 6.28 milliards in 1932-33. Most of the increase in the value of the products sold in 1939-40 was due to the larger quantities of fruit, vegetables, potatoes, sugar, and milk which were placed on the market.

*Land improvement works.* — The measures taken for increasing production have been systematically accompanied by long-term land improvement works. The Reich law of 16th June 1937 providing for the consolidation of scattered agricultural holdings, has laid the foundations for uniform legislation, valid throughout the Reich, for the consolidation of landed property.

The decree issued by the Reich Minister of Food and Agriculture on 16th November 1939 favours the conservation of the humus on which the growth of cultivated plants chiefly depends. The decree requires that measures be taken for the conservation and the reasonable use of humus before the Reich, the *Lander*, the provinces, or contractors carrying out works for public corporations, may start building operations which might entail the loss of large quantities of humus.

At the instance of the Reich Minister of Food and Agriculture the Reich Commission for Water conservancy has been set up. Its purpose is to provide for the uniform administration of the water régime throughout the Reich and to see that the erection or enlargement of industrial plants shall not, as in the past, alter the water system in such wise as to inflict serious injury on agriculture The importance for the food supply of the works undertaken since 1933 for land improvements and the regulation of water courses is shown by the fact that since that date 632,000 ha. of waste land have been brought under cultivation.

## The land tenure system.

The war has not been allowed to interfere with internal land settlement work. A decree of 28th August 1939 provides that agricultural labourers with large families and the sons of peasants who are not entitled to the family holding, will receive free grants to enable them to settle in the Eastern march of Germany. By another decree of 30th September of the same year these grants, which had been fixed at 4000 RM., have been considerably increased and the conditions improved.

Under the new arrangements, all peasant holdings which come within the inland settlement scheme receive from the Reich a grant of 8,000 Rm.

This grant will also be made to holdings belonging to agricultural labourers or rural craftsmen which, for lack of available means, are inadequately provided with farm buildings and which to be profitably worked urgently need additional buildings and more especially stables and barns. The Reich Minister for Food and Agriculture issued a further decree on 27th March 1941 (Lw. RMBl. No. 14), regulating, as from 1st January 1941, the payment of grants made by the Reich for farms set up under the plans for internal land settlement. Henceforth these grants will be on the scale required for providing the buildings of a newly established farm. If the farm is to be worked successfully the farm-house, stables, farm-yard and outbuildings must be of fixed dimensions, which are set forth in detail in the decree. Building costs are determined by these dimensions. If they cannot be fully covered by a sum paid

on account and by a fair rental (represented by interest and sinking-fund payments) then they will be met by a free grant made by the Reich.

The following figures indicate the progress made with internal land settlement. From 1933 to 1939 nearly 21,200 new farms have been provided for the peasants, covering an area of 546,000 ha.; 70,000 farms, with which new lands have been incorporated, have become hereditary peasant holdings. On 1st January 1940 land-settlement associations held for the needs of land settlement a total area of 107,300 ha.

A decree issued by the Reich Minister of Food and Agriculture on 12th July 1940 lays down the following guiding principles for improving rural buildings. The farms and villages must have a practical, rural character and must fit in with the landscape. The new villages must not be placed on the main highways but must be connected with them by roads All peasant farms must be made accessible by properly built roads. As in many parts of the Reich the land system is not yet satisfactorily organised, one of the objects rural planning has in view, besides the great settlement work in the Eastern territories, is that of reducing the number of farm units in the western part of Germany where it has been the custom to divide up the land freely among all the heirs Systematic efforts in this direction have been made for some years past with a view to improving conditions on the land. But if the reform is to be carried out in full, it will be necessary to transfer part of the rural population elsewhere, using their small and tiny holdings to form others of a reasonable size.

The Reich Minister for Food and Agriculture has issued special instructions for repairing farm buildings injured by the war. At the same time the authorities provide the financial resources required for such reconstruction in the form of loans to meet outlay. Loans are also made for replacing live-stock and equipment

A decree issued on 30th July 1940 (RGBl. I, p. 1065) codifies the laws and decrees on farm tenancy and provides a new régime for the protection of tenant farmers.

In the summer of 1940 the Reich Minister of Labour instructed the authorities responsible for carrying out the housing and land settlement measures, to prepare the new plans for the erection of dwellings. Future building plans are dealt with in an order issued by the Reich Minister of Food and Agriculture on 20th June 1941 (Lw. RMBl. 1941, No. 26). The Minister desires that the measures taken to increase agricultural production and the breeding of live stock be completed by measures for erecting farm buildings. To facilitate the execution of the future building programs he has opened a competition for plans for good farm-houses suited to the several parts of Germany.

## Agricultural credit.

The balance-sheet of the *Deutsche Rentenbank-Kreditanstalt* gives particulars showing the growth of agricultural credit. The amounts entered on the balance-sheet rose in 1939 for the first time to a sum of some 2,000 million RM. Now that the veto on new bond issues has been somewhat relaxed, the unsatisfied demand for land credit has been partially covered. Long time investment needs have been met by loans for farm development made out of the special funds of the D. R. K. and of the Reich. Personal credit supplied by the D. R. K., acting to some extent jointly with other banks, exclusive of loans made for investment purposes, amounted to some 990 million RM. Indirect agricultural credit plays an important part in the personal credit business. The

funds available for financing the marketing of agricultural produce have been considerably increased. The investment loans made to dairies, distilleries, flax-steeping plants, etc. are another form in which indirect agricultural credit is afforded. Land-improvement credit has been further developed. Loans for such purposes are now also made to communes and associations of communes

The amount loaned for land improvements exceeds 600 million RM.

The report of the *Deutsche Rentenbank Kreditanstalt* for 1940 further shows that the reduction in agricultural indebtedness secured in 1939-40 was twice that recorded for the previous year As a result of the lower interest rates current on the money and financial markets in 1940, the cost of the agricultural debt was reduced.

In relation to war-to economy, the Bank has given active assistance to the dairy industry, lending 8.8 million RM to dairies and for opening creameries. Among the new tasks undertaken by the Bank, mention should be made of the financial assistance given in providing working credit for the trust farms managed by the Company for Farming Lands in East Germany (*Ostdeutsche Landbewirtschaftungs*, GmbH), for repairing war damages to farms, and for reconstruction and improvement works undertaken to increase production This Bank is the only central credit institute for financing land-improvements It is now assigning further means for this purpose More definite provision was made by a decree issued by Reich Minister for Food and Agriculture on 7th December 1940 (Lw. RMBl No 51) for the service and repayment of these land-improvement loans. During the summer of 1940 the *Rentenbank-Kreditanstalt* was empowered to use 3 million RM provided by special Reich funds, for making loans on specially favorable conditions, to be used for improving the rural road system. The cost of the works was not as a rule to exceed 50,000 RM each.

The law of 7th December 1939 is of special importance for financing internal land settlement It raises the Prussian *Landesrentenbank* to the rank of a Reich institute, and makes it the exclusive long-term credit institute for granting loans for internal land settlement.

On 17th July 1940, the Reich Minister for Food and Agriculture, jointly with the other Departments concerned, issued an order for financing operations for reducing agricultural indebtedness. The *Deutsche Rentenbank* is thereby empowered to issue ammortisation bonds for 320 million RM. and the *Deutsche Rentenbank-Kreditanstalt* is authorised to make a bond issue of 60 million RM. for the same purpose. These bonds will be available for the repayment of trustee credits in East Germany in connection with debt settlements or with assistance to the peasantry.

## Agricultural social policies.

Since the beginning of the war, a series of measures of social policy have been taken to enable the families of the men called to the colours to maintain their living-standards in the absence of the breadwinner, who is generally speaking the father In this connection the situation of small agricultural holdings presents special difficulties They must continue to be cultivated intensively in the absence of the man who did most of the work. To remove some of these difficulties, the Reich Minister of Finance issued in the spring of 1940 an order raising to 20,000 RM. the lump sum granted for this purpose to small agricultural holdings. This grant should enable the farm to maintain those members of the family who have a right to support, and to make that contribution to the food-needs of the country which is expected of small and average sized holdings. The lump sum should, in short, ensure the regular working of the farm.

A decree of 22 April 1941 further raised the number of persons entitled to receive establishment grants made to farm workers and rural craftsmen, who have worked in that capacity for not less than five consecutive years, under the decree of 7th July 1938 for encouraging the rural population (RGBl. I, 835). All applications made under this law by persons who have married since 1st January 1929 are now taken into consideration. Unmarried mothers can also apply for establishment grants; in their case the date of the birth of the child is taken into account instead of that of the marriage

A decree of the Reich Housing Commission regulates the preparatory work and the financing of rural homes, building operations will be resumed on a large scale after the war. Building grants will be made for homes to be let to agricultural labourers and rural artizans Model plans for such homes are being prepared for 15 typical agricultural districts, they will be used for experimental purposes The Reich will make loans and grants to cover building costs

F GLAHE

Prof. Ugo Papi, *Segretario generale dell'Istituto, Direttore responsabile.*

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# AGRICULTURAL ECONOMICS AND SOCIOLOGY

# MONTHLY BULLETIN

OF

# AGRICULTURAL ECONOMICS AND SOCIOLOGY

## LEGAL AND POLITICAL ASPECTS OF THE EROSION CONTROL EFFORT IN THE UNITED STATES

by

PHILIP M. GLICK and EDWIN E. FERGUSON (1)

*This article forms part of a series dealing with the aspects of soil conservation in the different countries of the world. The United States Department of Agriculture has kindly furnished five contributions, four of which have been published in our Monthly Bulletin of Agricultural Science and Practice (See Nos. 6, 10, 11 and 12, 1941). The erosion problem in general, the program of the United States Soil Conservation Service, soil conservation research and local measures are the subjects of these four contributions. The series would, however, be incomplete if the legal and political aspects were not duly considered.*

*It was soon recognized in the United States that for an efficient control of erosion, account has to be taken of the existing constitution and laws. It is the purpose of this article to show briefly how the erosion control activities have been adapted to both the Federal constitution and the constitutions and laws of the 48 States. The formation of Soil Conservation Districts each covering the land bounded by a drainage basin or a watershed has been one of the basic measures of soil conservation. Difficulties arose immediately through the fact that the area of one soil conservation district was spread over several States. To describe how these difficulties were overcome is the chief object of this article. Similar problems will undoubtedly arise in other countries when soil conservation will be considered from a national point of view, and it is hoped that further contributions dealing with the specific legal problems of these countries will be received.*

SUMMARY: Introduction — Our Federal System Powers and Limitations - The Present Pattern: Federal action State soil conservation districts laws - Conclusion

### Introduction.

The central, or Federal, government of the United States is commonly known as a government of 'limited' or 'delegated' powers. The Federal Government has only those powers granted, expressly or by necessary implication, in the Federal Constitution. The 48 States which comprise the United States, on the other hand, are governments of inherent general power; they may exercise any governmental power not forbidden them, expressly or by necessary implication,

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either in the Federal or in the State Constitution. It results that, for a Federal statute to be demonstrated to be within governmental power one must point to language conferring that power, while a State statute must be deemed to be within governmental power unless one can point to a prohibition of the exercise of such power.

These facts have largely determined the pattern that erosion control efforts in the United States have thus far assumed. It is the purpose of this article to show briefly how our constitutional framework has molded the institutions through which the major portion of the nation's erosion control activity is now being carried on.

## Our Federal System. Powers and Limitations.

The Federal Government, among the powers granted to it by the Federal Constitution, has the following powers that are relevant in the field of erosion control

(1) The authority to spend Federal revenues 'to pay the debts, and provide for the common defense and general welfare of the United States'.

(2) The power to 'regulate commerce with foreign nations, and among the several States'.

(3) The authority to acquire and administer lands and other property.

(4) The power to make all laws which may be 'necessary and proper' for carrying into execution any of its granted powers.

The Federal Government is nevertheless limited in the exercise of its granted powers. Thus·

(1) No 'person' may be 'deprived' of 'liberty' or 'property' without due process of law'.

(2) There is an inherent limitation in the first grant of power mentioned above — the 'spending power' (aside from its use for paying debts and providing for the common defense) must promote the 'general welfare'.

(3) The Congress, the President, and the courts are each forbidden to delegate to either of the others any of the powers conferred, and no one of the three may invade the field assigned to either of the others. (This limitation is not stated expressly in the Federal Constitution, but has been judicially derived from the document as a whole).

As already noted, each State has inherent general governmental power. This statement is subject, nevertheless, to important qualifications. The Federal Constitution imposes the following principal limitations:

(1) No State may 'deprive any person of *** liberty, or property, without due process of law'.

(2) No State may 'deny to any person within its jurisdiction the equal protection of the laws'.

(3) State revenues may not be expended upon other than a 'public purpose'. (This too has been judicially derived — as an implication of the provision that no State may deprive any person of property without due process).

The State constitutions generally repeat the limitations on the exercise of governmental power by the States summarized above from the Federal Constitution. Many impose additional limitations, a few of which should be noted:

(1) All but a very few prohibit delegation of power from one department of the government—legislative, judicial, or executive—to another, and prohibit the invasion of their respective spheres.

(2) The constitutions of 10 States prohibit either the State or political subdivisions of the State, or both, from engaging in 'works of internal improvement' or impose limitations upon such action.

(3) The constitutions of 45 States prohibit the 'lending or donating' by the State or political subdivisions, or both, of credit, money, or property to or in aid of private persons.

## The Present Pattern.

### Federal action.

At the present time two Federal agencies, both within the Department of Agriculture, are engaged in nation-wide soil conservation and erosion control efforts (1). The Agricultural Adjustment Administration makes payments to farmers who carry out certain soil-building and other conservation practices and stay within acreage allotments with respect to certain staple crops, most of which are cleantilled and hence conducive to soil erosion. The erosion control program of the Soil Conservation Service consists mainly of research, demonstration, and technical and other assistance to soil conservation districts and other public and private agencies engaged in actual erosion control work. Its program, like that of the Agricultural Adjustment Administration, is entirely based on voluntary cooperation.

The two programs are predicated on the Federal Government's power to spend money to promote the 'general welfare'. The accepted view as to the proper definition of this spending power is that the Federal Government may tax and spend money in any manner which will promote the general welfare, and is not limited to taxing or spending for the purpose of carrying out its other enumerated powers. Hence, under this view, the 'general welfare' clause, although it does not authorize Congress to promote the general welfare by regulatory measures, does authorize Congress to tax and make expenditures in any manner that will, in the judgment of the Congress, promote the general welfare.

Because of a decision of the United States Supreme Court in 1936, in the case of *United States* v. *Butler* (2), there is some confusion over the extent to which

(1) The public works programs of the Civilian Conservation Corps and the Works Progress Administration, the activities of the Tennessee Valley Authority, the Federal flood control program, and the acquisition and administration of public lands by various agencies of the Federal Government also contribute to the national erosion control effort, but are not primarily directed to that end.

(2) 297 U. S. 1 (1936).

the Federal Government may spend money to promote the general welfare where the intended purpose of the expenditure is to influence action which is properly within the powers of the State governments. Despite the fact that Federal appropriations to further the programs of the Agricultural Adjustment Administration and the Soil Conservation Service may, through their subsidy features, influence action which lies within the regulatory powers of the States, it is extremely unlikely that the *Butler* case will affect these programs. The Supreme Court has held that no Federal taxpayer (*a fortiori* no other person) has a standing in court to challenge the validity of Federal appropriations—except possibly where, as in the *Butler* case, a tax is levied and an appropriation made as steps in a single program Since the appropriations for two Federal programs under discussion are made from the general funds of the Treasury and no special tax is identified with them, it appears that the appropriations are probably not subject to attack in the courts Moreover, the Court's decision in the *Butler* case has been severely criticized, and more recent decisions of the Court, notably in the cases sustaining the constitutionality of the Social Security Act ([1]), give ground for belief that the *Butler* decision will be gradually circumscribed and in time overruled

Obviously there are serious practical limitations upon the extent to which the spending power can be effectively used in carrying out a national erosion-control program. The effectiveness of the spending power lies solely in the persuasive power of financial or other aid in getting landowners voluntarily to apply control measures. The spending power cannot compel action Yet, if an erosion-control program is to succeed, the control of key lands must be assured. Conceivably the Federal spending power could be invoked to purchase such lands, and they could then be administered on a conservation basis under the power granted to the Federal Government to administer its own property. As a practical matter, however, the use of the spending power for this purpose, involving large expenditures and difficulties of administration, is hardly feasible.

The other alternative would be to require the present owners of the lands needing control measures to manage their lands properly This involves exercise of a regulatory power. The limited scope of Federal regulatory power in the field of land use under the Federal Constitution is directly responsible for the most significant recent development in the nation's erosion control efforts—State soil conservation districts legislation, based upon the broad inherent governmental powers of the States.

### State soil conservation districts laws.

Since 1937, 42 States have enacted laws which provide for the organization, upon petition by local farmers, of local governmental subdivisions called soil conservation districts. Generally the districts are organized by a State agency known as the State soil conservation committee, and partially financed by State

([1]) Steward Machine Co v. Davis, 301 U S 548 (1937); Helvering v. Davis, 301 U S. 619 (1937)

appropriations These districts have power to assist land owners and operators in carrying on erosion-control operations and to enact into law conservation ordinances needed for erosion control the requirements of which must be observed by all land owners and operators within the boundaries of the district Most of these laws follow generally the provisions of a Standard State Soil Conservation Districts Law drafted by Federal and State representatives in 1936 and recommended by President Roosevelt to the various States for consideration early in that year ([1])

The initial problem that confronted the drafters of the standard act was Should the statute be drawn in form appropriate for adoption by the Federal Congress, or to be submitted to the State legislatures? In the present case there were weighty policy considerations in favor of providing for an erosion-control program in national rather than in State legislation Nature has divided the United States into 76 major drainage basins or watersheds and an excellent case can be made out for organizing each of these basins into a single soil conservation district Since nearly all these drainage basin boundary lines cut across State lines the several States cannot by separate statutes organize these 76 districts This important consideration of policy had to be decided on wholly other grounds however because of the strong likelihood that the courts would conclude that the proposed statute does not as a legal matter fall within the powers which the Federal Government may exercise

It is true as we have seen above that the Federal Government may spend public moneys to promote the general welfare and hence to finance erosion-control operations This it may certainly do upon Federal lands and even upon privately owned lands to the extent that the landowner consents to the performance of such work Since it was proposed however that the districts should have authority to supplement assistance to farmers by enacting conservation ordinances for erosion control to be binding upon all lands within the district some regulatory power in the Federal Government would have to be pointed to The summary given above indicates that the only relevant power seems to be the power to regulate interstate commerce The Supreme Court of the United States has held that this power includes the power to promote transportation and navigation It may therefore well be argued that on the watersheds of navigable streams Congress may regulate private land use under the commerce power—since this land use will affect erosion and the erosion may interfere with transportation on the streams There was so little material available in court decision in this field at the time the standard act was drafted however that this conclusion could not be reached with certainty ([2]) Moreover, it was necessary in any

([1]) The ensuing discussion will probably be more meaningful if the reader can obtain a copy of this standard law which was published by the Department of Agriculture in 1936 under the title A Standard State Soil Conservation Districts Law '

([2]) There is more material in this field today however The last few years have witnessed a remarkable expansion in the Supreme Court's concept of the scope of the Federal commerce power See particularly Consolidated Edison Co v National Labor Relations Board 305 U S 197 (1938) Mulford v

event that the conservation ordinances of the districts should be applicable to all erodible lands. Erosion is not confined to the watersheds of navigable streams. It was decided, therefore, that the statute should be drawn for State rather than Federal action.

The constitutionality of the State soil conservation districts laws has yet to be determined by the courts. Decisions of the United States Supreme Court and of the several State supreme courts indicate, however, the nature of the principal constitutional challenges that may be directed against this legislation. It may be argued (1) that the enforcement of land use regulations on private lands will deprive the owners of those lands of liberty and property without due process of law, (2) that any State funds appropriated to finance the work of the districts, particularly to the extent that work is done with public money on private lands, are being expended for a private rather than a public purpose, (3) that legislative power is being improperly delegated by the legislature to the State committee which organizes the districts, to the district governing bodies, and to the farmers who vote in district affairs, (4) that there is a failure to provide equal protection of the laws, (5) that the State is entering the forbidden field of constructing works of internal improvement, (6) that the credit of the State is being lent or donated in aid of private persons, and (7) that some provision of the State constitution, express or implied, prohibits the organization of new governmental subdivisions. Other limitations also may be urged, derived from either the Federal or the State constitutions, but this list includes the more important arguments. Only the three objections first mentioned will be here discussed ([1]).

*Due Process and the Police Power.* — Two quite well established constitutional doctrines are relevant on the question of whether the proposed conservation ordinances can be said to deprive landowners of "liberty" or "property" without due process of law. On the one hand the guaranty of due process is held to protect the individual from interference by the State with the freedom with which he may carry on operations upon land he owns. On the other hand it is held that the guaranteed freedom is not absolute and the State may regulate private land use (or other private conduct) where necessary to protect and

Smith, 3[illegible] U. S. [illegible] (19[illegible]); United States v. Darby Lumber Co., [illegible] U. S. [illegible], 85 L. Ed. [illegible] (1941); United States v. Appalachian Electric Power Co., [illegible] U. S. [illegible], 85 L. Ed. [illegible] (1940). In the decision last cited, which involved the power of the Federal Government to control hydroelectric development on navigable rivers, there is sweeping language indicating that the Court might well hold that the Federal Government has constitutional power under the commerce clause to provide for the regulation of land use practices which have a direct and positive influence upon water runoff and hence upon the navigability of streams fed by the watershed.

([1]) For a more complete discussion of constitutional problems arising in connection with State soil conservation districts legislation, the reader is referred to the opinion of the Solicitor of the United States Department of Agriculture in the pamphlet (cited in note 5) which contains the standard law. See also GLICK, P. M., "The Soil and the Law," 1938 Yearbook of Agriculture, pp. 298-318.

promote the public health, safety, morals, or welfare. This protective power is traditionally called the police power.

What is the relationship between the guaranty of due process and the police power? The Supreme Court of the United States has said that the police power is the right of the *public* to regulate private rights where necessary in the common interest, and that the guaranty of due process demands only that the regulation not be 'unreasonable', 'arbitrary' or 'capricious', and that the means selected shall have a « real and substantial ' relation to the object sought to be attained. It is apparent that terms such as those quoted have no fixed content: they are variables which mean different things to different people. What from one social point of view may be entirely reasonable may from another be unreasonable and capricious. Nor does there exist a social calculus sufficiently exact to determine for all people what means have 'substantial relation' to what objects.

Trying to guess, therefore, whether the courts will hold that the proposed conservation ordinances for erosion control are within the police power is trying to guess whether the judges will believe that the ordinances are sufficiently necessary for the protection and promotion of the public health, safety, and welfare, that they are reasonable, not arbitrary or capricious, and bear a substantial relation to the goal of erosion control. There are two ways for divining the judicial mind an appeal to precedent and an appeal to reason.

The appeal to precedent reveals that there are no judicial decisions squarely in point. In decisions involving issues of similar factual content there exist competing analogies, and between these any court will be free to choose. On the side of the appeal to reason, however experience has adequately demonstrated that uncontrolled soil erosion causes silting of stream channels, reservoirs, and dams, loss of fertile soil, overwash of rich lands by subsoil, diminishing of underground water reserves, increase in speed and volume of rainfall run-off, and damage to highways, farm buildings, and other property in dust storms and floods. Erosion control is at one and the same time conservation of natural resources and food supply, flood control, water conservation. It would seem necessarily to follow that it is in direct promotion of the health, safety, and welfare of the people- hence 'reasonable', 'not arbitrary' within the police power, and not a deprivation of property or liberty without due process'. Whether the courts will so conclude it is too early to say.

*Due Process and Public Purpose.* Under the soil conservation districts laws the districts have power to build terraces and check dams on private land, to contribute labor and materials to these operations, to lend or give the use of agricultural machinery and equipment as well as seeds and seedlings, and otherwise generally to assist private landowners to control erosion upon their lands. The purpose of this work is, of course, to make erosion control effective, but it cannot be denied that individual landowners will be receiving private benefit from such expenditures. Insofar as these expenditures are made from appropriations of State funds to the districts, the charge must be met that they are expenditures of public funds for private rather than public purposes.

The general rule seems to be that where the benefit to the individual is but incidental to the object of public benefit, the expenditure will be held to be for a 'public purpose'. It is not easy, however, to predict whether a court will hold the private benefit to be merely incidental or to be the major object of the legislation in any particular case. Here again, appeal may be made to precedent and to reason. And here again, the voice of precedent blows both hot and cold, although there is considerable movement in the judicial decisions toward sustaining arguments of public purpose. On the side of the appeal to reason, it is difficult to escape the conviction that since the expenditures have for their object the control and prevention of soil erosion to avoid the evil consequences summarized above, they primarily advance a public purpose.

*Delegation of Legislative Power.* — The general rule is simple, but its concrete application is frequently difficult. The courts say that the legislature may not delegate to others the power to legislate. Inasmuch, however, as it is manifestly impossible for the legislature to anticipate every conceivable situation that will confront the administrative officers, and to define the rule to be applied to every situation, the general rule has come to be qualified somewhat as follows: The authority to prescribe administrative regulations to control the application of the statute to particular instances, as well as the authority to determine their applicability in particular cases, may be delegated by the legislature to administrative officers, but the statute must contain specific 'standards' to guide the administrative officers in formulating the regulations and determining their applicability.

The soil conservation districts laws run into this problem in several ways. It is necessary to decide whether a particular soil conservation district should be established; how its boundaries should be defined; whether a particular district should be dissolved; whether conservation ordinances should be adopted and what they should contain; whether different ordinances should be made applicable to different types of lands. Each of these determinations is admittedly legislative in nature; yet it would be folly for the legislature to attempt to determine these questions in the statute for each district and each farm. The logic of the situation compels the legislature to define the policy and leave its effectuation to others.

It is very difficult to determine from the legion of decided cases just what 'standards' the courts will deem sufficiently explicit to guide and control administration discretion. Where the court deems the standard sufficient, the delegation of legislative power is said to be proper; where the standard is deemed insufficient, the provision is invalid for 'improper' delegation of legislative power.

In the standard act, the State committee is directed to consider various specific factors, such as topography, erosion distribution, prevailing land-use practices, attitudes of the farmers, the votes cast in an advisory referendum on the question of creation of a district, the probable expense of operations, the wealth of the area, and similar considerations, in determining whether or not to create a district and what its boundaries should be. On the question of dissolving a district, these same factors must again be considered.

There is room for difference of opinion as to whether such standards, and other standards set forth in the standard act to guide administrative discretion, are specific or general. Many cases have recognised, however, that legislatures cannot be asked to perform the impossible, and that where the legislature has been as specific as the nature of the circumstances will permit, the rule against improper delegation has been satisfied. The standards set forth in the standard act seem adequate in the light of the general run of the decisions [1].

## Conclusion.

In the short space of this article it is impossible to discuss, even in a similarly sketchy manner, the other constitutional questions that might be raised with respect to the State soil conservation districts laws. It must suffice to say that the legislation has generally been drafted in a form designed to meet, insofar as can be predicted, the constitutional challenges that may be directed against it.

Whether or not any of those challenges can succeed depends, of course, upon the judgment of the courts to whom the challenges are addressed. The reader of the foregoing discussion will have seen that there is an enormous field for free and independent exercise of discretion by judges in deciding constitutional and other legal issues. He will have seen, also, that the language of constitutions presents nearly limitless opportunity for varying interpretations. Yet the very nature of a constitution makes it imperative that its provisions be couched in broad general phrases. A constitution is built to endure over an extended period of time. It must seek, therefore, to lay down general principles, leaving to each generation the nice adjustment of principles to the varying problems with which each must deal.

The present pattern of erosion control activity in the United States clearly indicates the way in which Federal and State constitutional provisions, as construed by the courts, have come to play upon our erosion control program, prescribed to a large extent what its administrative provisions must be, and created the institutional environment within which it must be made to operate. Soil conservation districts are rapidly becoming the focal point for erosion control activity; Federal, State, and local effort is largely channelling through them. Whether they, or any agency organized under State law having similar functions and powers, can effectively combat the erosion problem will depend initially on what the courts decide on the constitutional issues.

(1) The most crucial constitutional issues in the case of State legislation are those revolving around the concepts of 'due process', 'police power', 'public purpose', 'equal protection of the laws', and 'delegation of legislative power'. In the case of Federal legislation the central question must always be the existence of Federal power to deal with the matter at all. Only when this central question has been answered in favor of Federal power can we arrive at such other issues as delegation of legislative power, due process, and the like. These other issues are not dissimilar when applied to Federal legislation from the form they take in the case of State laws.

# INTERNATIONAL CHRONICLE OF AGRICULTURE

## ITALY

The economic and agrarian war policy upon which Italy embarked in 1940 and which was intensified in 1941, is comprised in a series of measures adopted for the purpose of conciliating the needs of a controlled food supply for the people with the requirements of the Commissariat for the fighting forces. The problems studied and solved were many and complicated, therefore, with the result that many measures were issued and enforced in order that the life of the nation might suffer as little as possible from restrictions and also to prevent interruption in agricultural and industrial production and trade.

The following is a summary of the measures adopted with regard to agriculture in particular

### Organization of food supply.

Everything done in connection with the control and distribution of food supplies during the period between the beginning of January and the end of September, 1941, was carried out in application of the law concerning food supplies which empowered the Minister of Agriculture and Forests, for the duration of the war to regulate food supplies and to control the distribution and consumption of foodstuffs, whether home-grown or imported, required for the civilian population and the fighting forces. For this purpose the Minister

(*a*) orders the compulsory registration and the declaration of stocks of agricultural products by all holders thereof,

(*b*) provides for the purchase, blocking and requisitioning of foodstuffs existing in the country as well as for purchase from abroad of commodities whose importation is authorized by the Ministry of Exchange and Valuta,

(*c*) assigns to the fighting forces, on the basis of requests received, the necessary quantities of foodstuffs,

(*d*) establishes the food requirements of each province and other regions to be supplied and provides for the allocation and distribution of available supplies,

(*e*) supervises and controls farms and the food industry factories as well as every other form of production, transformation, preservation and sale of foodstuffs, adopting suitable measures for controlling their activity and ensuring their operation;

(*f*) allots to the various factories, firms, etc., the foodstuffs to be preserved, transformed and distributed,

(*g*) issues regulations for the control and rationing of consumption and for checking speculation,

(*h*) provides for the creation of organizations of producers, merchants and industrialists in order to improve the arrangements for imports and exports of foodstuffs as well as for their purchase, blocking, requisitioning and distribution;

(*i*) takes in general all the necessary measures, in order to guarantee supplies and to control distribution and consumption

For the carrying-out of the above work the Ministry of Agriculture and Forests has created a central office known as the *Direzione Generale dell'Alimentazione*, while in the chief town of each province the work is carried out by the existing Food Sec-

tions attached to the provincial Councils of Corporations. At the head of each is a director appointed by the Ministry of Agriculture and Forests, on the advice of the Prefect.

## Reorganization of agricultural services.

The Royal Decree No 489 dated May 29, 1941 (1), provides for this reorganization. This important reform provides in the first place for a better distribution of the functions of the administration of agriculture and forests, the number of divisions having been increased to seven while at the same time it makes radical changes in the consultative field of the administration's activities by substituting a single consultative organ, called the Supreme Council of Agriculture and Forests, for the numerous and varied existing commissions The Supreme Council is divided into five sections experimentation and plant pathology, grass and tree crops animal husbandry and hunting, land reclamation and settlement forests

The structure of the Council (which is formed chiefly of experts holding university chairs, or attached to the agricultural inspectorates and the more important experimental institutes), and the fact that since the Council is divided into sections, the consultative responsibilities are entrusted to specialists guarantee that the technical opinions which the active services are called upon to give will carry the necessary weight.

As regards the provincial services, experts in plant pathology are attached to most of the inspectorates in the provinces, for the purpose of obtaining more rapid action in regard to the notification of disease and other dangers threatening plants, this arrangement also makes it possible to combat the dangers with the necessary speed

Special importance attaches to the reform of the agricultural experiment stations, whose appropriations and staff have been increased The number of these institutes has been fixed at 28, seven of which are occupied in general studies, while the remaining 21 specialize in special branches of agricultural production

## Agricultural registration and rationing.

As a result of the duties assigned to the Ministry of Agriculture and Forests under the terms of the law concerning the food services and in order to make it possible to control the existing stocks of prime necessities in the hands of agricultural producers, industrialists and tradesmen, the Ministry proceeded to take the following censuses which were carried out by the central office for food statistics, specially equipped for this work in the first place a census was taken of stocks of wheat, maize and their flours, alimentary pastes, rice, oil, butter, bacon and lard and later broad beans and other cereals fodders milk and its derivatives, meat, livestock, seeds, eggs etc The results of the surveys carried out revealed the necessity for restricting consumption of products in which there was a shortage, by blocking them at the disposal of the Ministry, prohibiting their sale and purchase and controlling distribution to consumers by means of ration cards. Rationing was gradually extended from alimentary pastes, rice, flours, sugar and laundry soap to the various fats, such as butter, bacon, lard, sausages, meat and, at the beginning of October, 1941, also to maize flour and bread. Justification for the rationing of this last group of commodities is found in the poor wheat harvest, which this year amounted to only 71,500,000 quintals.

(1) *Gazzetta Ufficiale del Regno d'Italia*, No. 139. Rome, June 26, 1941.

Special mention should be made of the census taken on June 30, 1941, of the number of head of cattle, buffaloes, pigs, sheep, goats and horses existing in Italy on that date. The results of the census show a satisfactory situation as regards numbers of livestock in the Kingdom, in spite of the higher demand for meat for the fighting forces and the reduced opportunities for importing animals for slaughter.

Although it is not possible to reproduce statistics concerning the actual numbers of livestock raised in Italy, it should be mentioned that Italian agriculture has in no way slackened the pace of its progress in the animal husbandry sector. This proves the efficiency of the measures adopted long before the outbreak of hostilities by the Ministry of Agriculture and Forests to encourage the raising of livestock, to increase the fodder crops and later gradually to reduce the consumption of meat by the civilian population.

The figures concerning the number of head of livestock as of June 30 last, will be taken as a basis for establishing the percentage of cattle, buffaloes, sheep and goats which each breeder is compelled to hand over for slaughter between July 1, 1941, and June 30, 1942, as regards pigs, they will be used to determine the number of head of fattened pigs to be killed for sale, after leaving breeders a sufficient number of animals for the needs of the family. It will thus be possible to establish in advance for the coming year a general plan of meat supplies, special account being taken of the needs of the fighting forces and of the farmers.

## Cereals, oils and other products.

The need for establishing the country's independence of imported wheat led to the issue on July 20, 1941 (1), of the decree publishing the conditions of the XIX Italian competition for the Wheat Campaign. There are to be 879 prizes for a total value of 1,500,000 Lire.

In order to encourage farmers to increase the area sown to wheat and to intensify the cultivation of this cereal, several measures have been adopted which may be summarized as follows:

(*a*) a supplementary payment from Government funds of 20 lire per quintal, already paid on the 1940 and 1941 harvests, over and above the basic price of Lire 135 and Lire 150 paid respectively for hard and soft wheat,

(*b*) a second supplementary payment, also from Government funds, paid in respect of the 1941 harvest, in order to encourage early delivery to the pools and amounting to Lire 40, 30 and 20 per quintal, for deliveries effected respectively between June 1 and 15, June 16 and on and after July 1;

(*c*) a new bonus, also paid from Government funds, amounting to Lire 200 per hectare sown to wheat, rye or barley;

(*d*) an increase in the price of early wheat to be produced in 1942, amounting to Lire 40 per quintal for grain grown in Southern Italy and the Islands and Lire 20 for that grown in the remainder of the Kingdom;

(*e*) exemption from the prohibition to grow crops for hydro-geological reasons on waste lands not covered with forest growths, this exemption will be granted without delay by special provincial commissions empowered to decide in the matter.

As a result of the above-mentioned measures, which, in respect of the provisions under letter *c*) alone, involve an outlay by the Government of over 1,000 million lire, a maximum effort has been made as regards autumn sowings.

(1) *G. U.*, No. 177, July 29, 1941.

In connection with other crops, mention may be made of the decree issued by the Minister of Agriculture and Forests, instituting the III national competition for increasing production of maize, potatoes and broad beans [1] as well as the instructions issued for the new agricultural season and the raising of oil-producing plants.

According to these instructions, the area sown to wheat– in view of the basic importance of this cereal in the country's food supply– may not be reduced, but must instead be increased wherever there is land suited to this crop which may be included in the existing rotation. When the varieties best suited to each zone have been selected, preference should, generally speaking, be given to the early varieties, not only because of their capacity for giving a higher yield per unit of area, but also because by their use the product can be ready much earlier for consumption. The cultivation of these wheats must be extended to the areas in Southern Italy and the Islands, to replace the hard and soft wheats which ripen late or at the usual time.

Wherever suitable ecological conditions permit, encouragement should be given to crops of maize, rice, rye, oats and barley, as well as of pulse, such as broad beans, beans and other less important pulse crops, and potatoes Industrial plants should not be forgotten, such as sugar beets, the textile plants (hemp, flax, cotton, etc ), field vegetables and the various species of oil-producing plants

The national importance at the present time of the production and utilization of oleaginous seeds and fruits has induced the Government to adopt special measures for their complete control Among these measures one consists in compelling farmers who intend to grow oil producing seeds or fruits to obtain a permit for the cultivation of this crop

It should be observed that a considerable contribution may be made towards an increase in the output of oil and seeds by extending the area sown to colza and field cabbage for seed, as well as of flax, sunflower, sesame, groundnuts, castor oil plant, etc.

Another sector of great importance is that of fodder crops While, on the one hand, they supply large quantities of fodder which are essential for an increase in livestock, they also, on the other hand, may be considered as an index of the evolution of the system of cultivation adopted on the farms and of the degree of stable, basic fertility attained on the land

In conclusion, it is considered essential that, under present circumstances, no square inch of land should remain uncultivated and that not even the tiniest holding should produce less than what can be obtained at the expense of every possible effort on the part of whoever works it. The absolute certainty of being able to sell the foodstuffs produced at remunerative prices enables every farmer to feel perfectly easy in his mind and to profit by the encouragement and help offered him by the Government services in overcoming every difficulty.

## Control of supplies.

The necessity of overcoming as well as possible the various difficulties due to the war has led the food services to control every sector of agricultural production in order to guarantee supplies and prices for consumers and also to protect them from undue cornering and speculation. Consequently, while on the one hand the Ministry has arranged for the blocking, marketing and consumption of the various types of meat (beef, mutton, goats' and pig meat), by fixing certain days in the week when civilians

[1] *G. U.*, No. 177, July 29, 1941.

may purchase meat and has made regulations concerning the procedure and movement of the meat market, on the other hand, it has turned its attention to the question of oils, fats and cereals, strengthening and extending the pooling system and reinforcing the control of supplies and distribution of foodstuffs when it is considered that it is impossible or unsuitable to subject them to the system of pooling. So, for instance, under the terms of the Ministerial decree issued on September 24, 1941, potatoes and dried pulse (beans, chickpeas, lentils, peas, etc.), broad beans excepted, are blocked at the disposal of the Ministry of Agriculture and Forests. All quantities of dried vegetables required for the normal use of the producers' families, including potatoes up to a maximum of 60 Kg., necessary for each member of the farmer's household, are exempt from the blocking.

As regards stockbreeders, besides the measures mentioned above the ministerial decree issued on September 10, 1941 (1), provides for the complete control of the assembly and distribution of sheep and goats for slaughter, while the ministerial decree of August 27, 1941 (2), issues further instructions concerning the control of the supplies of pigs for slaughter and the use of pig meat for the fighting forces and the civilian population.

As from October 1, 1941, all sheep and goats for slaughter must be delivered to the wool sector. In all cases, every proprietor is compelled to hand in the following minimum percentages of his head of stock sheep and goats under one year, 50 per cent of the bearing sheep, sheep and goats over one year, 7 per cent. of the total number of the flock.

## Other measures.

The Ministry of Agriculture and Forests has issued many other provisions but, for the sake of brevity, only the chief of these need be mentioned.

Arrangements have been made for the control of the delivery of cow's milk for direct consumption and for industrial transformation. Control of the dairy market has been organized, measures have been adopted concerning the price of milk, butter and cheese; the distribution of meat, the production of oil-seeds, the distribution and consumption of tinned foodstuffs have all been put under a single system of control. All quantities of hay and wheat, oats, rye and barley straw produced in the kingdom or imported from Italian Africa, Albania or from abroad have been blocked and are held at the disposal of the Ministry of Agriculture and Forests. Arrangements have been made to constitute an adequate stock of eggs to be sold to consumers during the autumn and winter periods.

## Land reclamation and settlement.

In spite of the war no interruption has taken place in the carrying-out of the great agrarian policy. The pace has, of course, slackened somewhat, but the results obtained are nevertheless considerable, especially as regards the preparations being made for future progress.

Land reclamation activities carried out between January and September, 1941, may be summarized as follows:

(1) G. U., No. 217, September 13, 1941.

(2) G. U., No. 209, September 4, 1941.

authorization has been given for the execution of public works in connection with land reclamation for a total exceeding 120 million Lire. Government contributions towards land improvement amount to some 180 million Lire. New settlers' houses completed totalled 1268 at a cost of 75,337,065 Lire, houses enlarged for the reception of new families totalled 161, the cost involved being 13,148,195 Lire, while 658 were enlarged or repaired in order to improve living conditions, at a cost of 34,800,427.

At the meeting of the Council of Ministers held on September 27 last, a bill was approved for the creation of the *Ente Acquedotti Siciliani* (Corporation for Sicilian Aqueducts). The problem of water supplies for the Sicilian population is now on the way towards solution owing to the construction by the Government of the large Littorio, Madonie, Favara, Burgio and Messina aqueducts, which are either completed or almost completed, as well as through the impetus given to the construction of other aqueducts serving numerous communes, such as the Bosco Etneo (Catania) and the Tre Sorgenti (Agrigento) water supplies.

No less importance attaches to the problem of the adjustment and preservation of various other water works belonging to communes or consortia in the region. Since many difficulties, both financial and technical, are encountered in connection with the installation and management of works of this description by the communes, it has been decided to entrust this task to a single Government concern supplied with the necessary organization and equipment.

(*Concluded on October 8, 1941.*)

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## UNITED STATES (1)

### General farm and business conditions.

Farm and nonfarm business in the United States were better, and in a better interrelationship, in the fall of 1939 than they had been for more than a decade. Cash farm income from marketings and Federal payments was on a level that indicated a total for the calendar year of about $ 8 500,000,000 as compared with a cash income (from marketings alone) of only $ 4,682,000,000 in 1932. It had been expected, before the outbreak of the war in Europe, that the cash farm income would be less than that of the previous year, but it proved to be greater though somewhat below that of 1937.

Other factors in the farm situation, notably a reduction in the total farm mortgage debt and broad cooperative action under Government auspices for soil conservation and acreage adjustment, combined with the favorable income level to encourage farmers greatly. The second half of the year had been characterized by widespread improvement in manufacturing and trade within the United States and the year closed with the uptrend maintained. Farm prices improved. There was even a prospect that an increased demand for factory labor would reduce rural unemployment.

In 1940 the cash farm income (receipts from marketings plus Government payments for soil conservation and crop adjustment) totaled about $ 9,000,000 some

(1) Supplied by the Bureau of Agricultural Economics, Washington. — *Finished in July 1941.*

$ 470,000,000 or 6 ½ per cent more than in 1939. Exports of munitions and the national defense program increased the buying power of consumers, from the standpoint of agriculture as a whole, more than enough to offset the decline caused by the war in the country's farm export trade. After the events of the summer of 1940 in Europe the Federal Reserve System's index of industrial production rose sharply. It advanced by December to 136 The average for the year was 122, as compared with 108 in 1939, 113 in 1937, and 110 in 1929. Growers of certain fruits and vegetables, dairy men, and livestock producers benefited substantially.

Necessarily, however, the improved domestic situation affected different groups of farmers unequally. It helped the export producers very little Takings by foreign countries of United States tobacco, fruits, and grains were in each instance 30 per cent or more below those of 1939. Without Government assistance, the producers of these crops would have been in dire straits Activity in the defense industries, with the stimulus it had on employment, payrolls, and profits, warranted increased farm production for consumption within the United States; whereas the collapse of the export trade required reduced farm production for export

## Foreign trade and foreign trade policy.

American agriculture before World War I stood in a satisfactory relationship to foreign markets. Agricultural prices rose more than other prices. Net farm earnings increased, and also farm valuations. Farm exports declined slowly, but growing consumption at home provided compensation. The war drew the United States back into tremendous production for export, while saddling the importing countries with debts and political troubles that reduced their buying power Temporarily it created shortages of agricultural commodities, but farmers overestimated the shortages and soon replaced them with surpluses Tariffs excluded foreign goods which this country might have received in payment for its agricultural exports. Loans furnished our foreign customers an undependable means of payment which eventually failed. The crisis of 1929 developed largely as a consequence of these inconsistencies, though monetary difficulties in many countries played a part therein. As their buying power declined, the United States and other countries adopted trade restrictions which added to our export difficulties, and brought world trade under governmental control to an extent unprecedented in modern times. As a result, the demand for the products of the farm dropped catastrophically, while the production remained virtually unchanged.

## Trade agreements.

In this situation the Government of the United States took positive action along two main lines. One line was an agricultural adjustment program, with the broad objective of bringing the total farm output, and particularly the production for export, more nearly in line with the total demand. The second line of action was a reciprocal trade-agreements program.

It was not contemplated that the readjustment of our agricultural plant should eliminate production for export. The expectation was that our farmers would continue to require foreign markets for cotton, wheat, pork products, tobacco, and fruit. It was necessary to find some means of improving our foreign markets. The method chosen was the reciprocal trade-agreements program, which Congress authorized in 1934. It rested on the fundamental thesis that a nation must buy if it expects to sell.

Specifically, the major objective of the program was to make possible an increase in imports through carefully considered reductions in our own high tariff rates. In

return for such reductions it sought reductions in the trade barriers that faced American agricultural and industrial goods in foreign markets. This program led to the completion of trade agreements with 21 foreign countries. These countries in the past had provided the outlets for approximately 60 per cent. of our agricultural export trade. Needless to say, the war hampers action under the reciprocal trade agreement policy, though negotiations are continuing with a number of countries. Our cotton exports in the past two seasons have shrunk about 85 per cent., and our exports of tobacco and fruits about 70 per cent. Our exports of wheat and pork products have dropped to less than the very low volume of the 1930's.

## Farm programs in the domestic field.

Conversely, the war enhances the scope for Government aid in the domestic sphere —notably to farmers in crop adjustment, soil conservation, the marketing of agricultural surpluses, and rehabilitation of distressed farm families. Central in the work is aid to farmers in national and regional land use readjustments, with special emphasis on the conservation of soil, water, and desirable vegetation, and on land-tenure improvement. Progress along this line is progress also in keeping production in line with demand. There are activities also for aid to share-croppers, tenants, and migrants; for the distribution of farm surpluses at low cost to families on relief, for the stabilization of supplies and prices through crop loans and storage, for the provision of agricultural credit on easy terms, for crop insurance, and for rural electrification.

In crop adjustment and soil conservation efforts the Government makes payments to farmers for shifts from soil depleting to soil conserving crops, and for using other methods to check erosion and loss of fertility. In 1940 Government payments to farmers for crop adjustment and soil conservation totaled about $672,000,000. More than 6,000,000 farmers co-operated. Farmers help to administer the programs. In every agricultural county they elect certain of their neighbors as community and county committeemen, whose task within limitations imposed by the general policy is to recommend acreage and soil building goals. With the help of Government data on crop prospects, prices, and production, supplies on farms, exports and export prospects and domestic demand conditions, they establish acreage allotments farm by farm. These adjustments, however, do not eliminate crop surpluses immediately. Hence, the Government makes loans to farmers on cotton, wheat, corn, and tobacco, so that excess supplies can be held in reserve. In this way it supports farm commodity prices. Borrowers obligate themselves to participate in continued crop adjustments.

## The Ever-Normal Granary.

The combination of crop adjutment, soil conservation, commodity loans, and commodity storage adds up to the ever-normal granary program. The purpose is to insure stable abundance. It requires efficient production based on science and technology; crop adjustment to keep supply as nearly as possible in line with markets at home and abroad, soil conservation through which the farmer protects the land market stabilization, and surplus removal operations. Crop insurance for wheat constitutes an additional part of the ever-normal granary. It may be extended later to other crops.

Needless to say, the ever-normal granary has to do with far more than just the physical storage of crops. It covers all the facilities possessed by agriculture and by the Federal agricultural agency for promoting stable abundance. Storage alone, in bins, granaries, and warehouses, is only part of the machinery albeit a very necessary part. Equally important is the adjustment of production on farms and ranches, so

that the bins, granaries, and warehouses will not overflow. Moreover, the system must provide also for the orderly withdrawal of supplies from storage, since the end of production is consumption. In the ever-normal granary system we have machinery designed to regulate oncoming supplies, to maintain reserves against seasons of shortage, to stabilize prices at levels fair to both the producers and the consumers, and to distribute crops efficiently. It is proving very handy just now as a means of quick national response to defense needs and wartime export conditions.

### Domestic disposal of surpluses.

Still another means whereby the Government helps farmers in dealing with the surplus problem, and at the same time helps consumers, is the disposal of surpluses in the domestic market. It includes the food stamp plan, which places increased buying power in the hands of families on relief, and similar later developments such as the cotton stamp plan and the cotton mattress plan There are also a school lunch program and a low-cost milk program Surplus disposal through relief agencies is an additional means of absorbing farm surpluses and aiding the poor Surrpluses are an aspect of underconsumption Adequate mass consumption would absorb most of them When the war stops, domestic surplus disposal may become more urgent There is no assurance yet of full peacetime employment for all workers Even if the return of peace does not cause industrial depression, this country will still have need for high domestic consumption and the automatic working of the economic system may not wholly ensure it

### Agricultural labor.

Hired farm labor suffered during the depression along with other farm groups, but did not share proportionately in the ensuing recovery Farm wages remained low as compared with farm prices and city wages, moreover, machinery continued to supplant manpower on the land Under the Sugar Act of 1937 the Government established minimum wage standards for sugarcane and sugarbeet workers and discouraged child labor. Through the Farm Security Administration it alleviated the sufferings of migrant farm laborers and their families It endeavored also, through farm family rehabilitation and in other ways, to check unnecessary labor migration at its sources, and to guide unpreventable migration toward new opportunities Nevertheless, the farm-labor group remained under heavy disabilities, notably exclusion from the benefits of the National Labor Relations Act, the Social Security Act, and the Fair Labor Standards Act

Even the regularly employed hired man is not so well off in the United States as he used to be He has a less personal relation to his employer, and less chance to become a farmer himself. The seasonal farm worker is in a bad position, with a meagre standard of living, no security of employment, no stale part in community life, and frequently no protection from abuses of the civil authority. These conditions have given rise to organized movements of agricultural labor and to many strikes in large-scale farming In 1933 about 50 agricultural strikes occurred with 60,000 workers involved. There were about 30 agricultural strikes with about 25,000 workers affected in each of the three succeeding years. In the predepression years agricultural strikes were rare.

As one line of attack on the problem the Government emphasizes farm improvement generally, so that employers will be able to afford better wages and working conditions. Equally important is industrial recovery. In recent years urban industry has not absorbed farm youth to the extent that it once did. There is an opportunity

to lessen the troubles of seasonal farm labor through more effective placement and information services. It may be possible also, the Government believes, to provide more continuous farm employment, through the development of new crop sequences and perhaps the transfer of some processing operations to the farm. The increase of farm-labor orgnizations and of agricultural strikes draws attention also to the desirability of dealing with controversial issues by the conference method, and of developing methods to stabilize farm-wage rates so that aimless migration will decline

## Aids for migrants.

The suffering of migrants urgently demands attention Primarily as a sanitation measure, the Farm Security Administration started several years ago to build camps where migrant families could live There are 13 of these camps in California where the migrant problem is most urgent, 3 in Arizona 4 in Texas, 2 in Idaho, 2 in Florida, and 1 each in Oregon and Washington So that some of the migrants may get permanent homes, the Farm Security Administration has built small cottages known as labor homes near some of its permanent camps These cottages rent for about $8 a month to families who are able to find year round work on nearby farms Sanitary camps and labor homes have helped to check the spread of disease But the ultimate cure for the migrant problem and related problems is not in the rural sections at all It is in the cities Only an increase of urban industry and of urban employment can prevent the continual increase of poor farms in regions of poor soil, and the continual increase likewise of rural distress and aimless rural wandering

## Evolution of the national agricultural policy.

It is commonly believed that the United States never had a truly national agricultural policy until after the first World War but the country has always had a national agricultural policy In the period of westward migration, of rapid land settlement, and of ruthless exploitation of natural resources, the policy was negative It was mainly one of noninterference with the private appropriation of land for use or misuse Despite its laissez-faire character, we cannot call that procedure a mere lack of policy It expressed a definite philosophy and, indeed a definite program. It was what the dominant forces in the country wanted and what the majority of the people at least tacitly accepted Our national agricultural policy in the nineteenth century reflected the belief that national welfare could best be promoted through individualism and unrestricted competition

For a long time this theory apparently stood the test of practice With abundant land, an open frontier, and a relatively sparse population, the quickest way to increase production, and therefore wealth, was to get the resources into private hands. Occasionally production overshot the market, but the resulting depression did not last long and did not shake the country's faith in the exploitation program Various administrations encouraged farming, ranching, lumbering, and other land uses through homestead laws, grazing privileges, land grants, favors to transportation companies, lenient taxation, and irrigation. Few looked forward to the closing of the frontier and to the ruthless competition that would ensue. Most people seemed to think the policy that had been adopted could be continued indefinitely

Recklessness in one age, however, imposes prudence on the next. There are sharp contrasts between the agricultural views and programs that dominated the nineteenth century and those that shape our agricultural policy today. But the contrast

does not mean that the present has broken with the past or that tradition has been wrenched from its path. On the contrary, it signifies that cause and effect have operated normally. The new agricultural policy is the direct result of the old one and of the conditions and problems which the old policy created. As the occupation of the continent proceeded, the expansion program ran out of material. It ran out of land and forced the land hungry into submarginal farming, destructive grazing practices, and forest devastation Land charges accumulated on the older-settled land and drove producers into overproduction Exploitation, in short, created the need for conservation, and simultaneously excessive competition generated a need for corrective regulation. It is because our forbears went too far in one direction that we must now move in another

## National land policy.

Among numerous forces that shape our land policy two are paramount: (1) the closing of the frontier, with the resulting pressure of population on resources, accompanied by soil wastage and actual soil destruction and, (2) the world-wide growth of economic regulation, not only in trade but in production. Governments are assuming greater responsibilities for the regulation of commerce, both domestic and international. Another shaping influence is the growth of industrial trusts and combinations. Into an economic pattern of that sort, a purely competitive, wholly individualistic agriculture does not fit Together, the disappearance of the frontier and the rise of economic controls of one kind or another in Government, and in urban industry, seem destined to exert more and more influence, which will express itself in agricultural legislation and policy no matter what political party may be in power.

Our earliest national land policy rested on the belief that each man had a right to unrestricted ownership of a parcel of land. It was not until 1862, however, when the Homestead Act was passed, that the idea of providing free land to settlers gained sufficient strength to be written into law. The Homestead Act permitted the head of a family to obtain 160 acres of land practically free of cost by living on it for 5 years. This policy held on long after its usefulness had passed.

In the East 160 acres was ample land to care for the needs of a family But when transplanted west of the Mississippi Valley, the homestead policy failed In arid and semiarid western plains 160 acres could not produce even a bare subsistence for a family. Not until the twentieth century, after practically all of the arable acreage had been taken up, were the homestead laws modified so as to let settlers stake out more than 160 acres Even under the amended laws the units established were often too small.

Many of the land use problems we face today began to appear long ago. Tenancy increased. The march of cotton from East to West across the South left a trail of erosion-scarred abandoned farm land. As long ago as 1878 soilsmen reporting on the lands in the arid regions warned Congress of the ill-effects of the homestead policies. In 1904 the Public Land Commission reported overgrazing of the public domain Foreign outlets for our farm products tapered off, and farmers had to adjust their production accordingly. Cereals produced on low-yield, windblown land ceased to pay. Slowly the Nation awakened to the need for conservation. Then the war of 1914-18 broke out in Europe. The war temporarily diverted attention from the developing conservation policy, reversed the market and land use trends, and released forces that led to agricultural catastrophe.

## Regional land use adjustments.

In the post-war agricultural program, the first object was to help farmers get rid of price-depressing surplus supplies and adjust their use of land to the contracted market. That, however, was not enough. Local and regional land use adjustments were necessary. In the "Dust Bowl" (1), for example, wartime and post-war wheat expansion had led to maladjustment between farming and climate. Much of the land in the Southern Great Plains should have been left in grass. But it was not, and duststorms of unprecedented magnitude swept it in the 1930's. It was imperative to adjust the use of land not only to the market but to the dictates of nature.

Many other regional adjustments were pressing. Special land problems demanded attention in the cut-over areas of the Lake States, on the overgrazed western range, in the eroded Piedmont, in the Northern Plains, and elsewhere National interest in soil conservation reawakened. Gullying had caused concern, and had ruined many thousands of acres Sheet erosion, which carried the soil from sloping cultivated lands evenly, had occurred widely. Surveys showed that some 57 millions of acres already had been essentially destroyed for further tillage, that erosion had removed more than three-fourths of the topsoil from 12 per cent. of the land or 225 million acres; and had removed one-fourth to three-fourths of the topsoil from 41 per cent of the land, or 775 million acres In some measure these were all public problems

## Action to check soil erosion.

The Government determined to help farmers use their land better. One requirement was to discover and demonstrate methods of cultivation and land use which would retard the water run-off and reduce erosion. This study the Government undertook through the Soil Conservation Service An enlarged research and demonstration program resulted, which brought various measures to bear on selected farms in watershed areas of 25,000 to 100,000 acres The next problem was to spread conservation practices to farms other than those in the demonstration watersheds. In 1937 the President urged the States to enact laws patterned after a sample law known as the Standard State Soil Conservation Districts Act This Standard Act was drawn so as to permit groups of farmers to organize local soil conservation districts and engage with public help in cooperative action to control erosion. The State soil conservation districts laws, now enacted by 36 States, place the responsibility for formulating and carrying out an erosion-control program squarely upon the shoulders of local people. By 1940, 221 soil conservation districts, covering 173,384,707 acres, had been organized in 27 States.

## Submarginal land and rural poverty.

It was necessary also for the Government to do something about submarginal land. Much land that is submarginal for agriculture was poorly adapted to farming even when it was fresh and new. Other land has been made poor by bad farming.

(1) The "Dust Bowl" includes western Oklahoma, western Kansas, eastern Colorado, the panhandle of Texas and parts of Wyoming. (*Editorial note*).

First with emergency funds, and later with funds under Title III of the Bankhead-Jones Act of 1935, Congress provided means for shifting submarginal farm land to nonfarm uses. This law authorizes the Department of Agriculture to purchase lands unsuited to cultivation and develop them for forestry, grazing, or other suitable purposes. By itself, however, the purchase of submarginal land seldom rehabilitates an area. It must be combined with other land use adjustment programs, particularly the relief of rural poverty; for submarginal land and rural poverty go together. Generally, moveover, the population on poor land increases faster than the population on good land. Shifting submarginal land to nonfarm uses raises a problem in the rehabilitation and relocation of farm families.

In the depths of the depression, the Federal Emergency Relief Administration undertook to help the rural destitute. Approximately a million farm families in the United States received relief. Since then three and one-half million rural families have received public assistance. Two million of these families were farm families. Many lived in single cash crop areas, and were the victims of ruinously low prices as well as of soil erosion, floods, duststorms and other bad conditions. They needed credit, guidance in farm management, and sometimes help in moving to better land This task fell originally to the Resettlement Administration, and subsequently to the Farm Security Administration in the Department of Agriculture.

## Growth of tenancy.

In our period of the open frontier when land was plentiful and population sparse, the path to farm ownership was easy, and the dominant factor of the land-tenure system was owner operation No one had to work long for another, either as laborer or tenant, if he cared to set up in farming for himself. There was good land to be had free, or at a very low price. But as the country filled up and the good free or cheap land disappeared, newcomers had to apply for land to those who had preceded them. They had to become tenants or to buy farms on terms which entitled the former owners to a large share of the earnings for a long time. Eventually, even these expedients became difficult or hazardous. More people wanted to rent land than could get it, and would-be purchasers had to assume heavy fixed charges. Suddenly we discovered that we had a large army of landless farm people for whose welfare and security we had made little or no provision.

It is estimated that the ranks of tenant farmers are growing at the rate of 40,000 a year. One tenant out of 3 moves each year, with resulting gradual impoverishment of the tenants, the land, and the landlords. Civilization in a democracy will lose one of its foundation stones if land ownership and land operation grow apart. The Department of Agriculture has been empowered to deal with the tenancy problem in a small way. Through the Farm Credit Administration, it supervises the work of the Federal Land Banks, which advance to buyers on long-term loans as much as 50 per cent. of the appraised value of the farm, plus 20 per cent. of the appraised value of the improvements. Another attack on the tenancy problem goes forward under Title of the Bankhead-Jones Act. This measure authorizes the Farm Security Administration to make loans to tenants, croppers, and farm laborers for the purchase of farms. The loans bear 3 per cent. interest, run for 40 years, and cover the full value of the farms. Committees of local people approve the loans on the basis of the character, ability, and experience of the applicants. Farms purchased under this system must not be larger than the operators can handle with their own labor and that of their families, and they must follow agreed farm plans.

## Land in flood control.

Land treatment for flood control is in prospect under the Flood Control Act of June 22, 1936, which establishes national flood-control policies. This act authorizes a coordinated land and water program, it charges the War Department with the responsibility for improving rivers and waterways, and the Department of Agriculture with responsibility for run-off and water-flow retardation and soil-erosion prevention on the flood-producing watersheds. Subsequent amendments to the basic act have reiterated this principle. Approach to the problem of flood control is usually similar to the approach to the problem of soil conservation. In the erosion-control program, however, flood-control benefits are incidental. In the flood-control program these same benefits of course are primary with soil conservation incidental. Nevertheless, benefits from flood-control measures on the land cannot be realized without holding the soil in place. Land measures not only hold water from directly entering streams, but withhold soil from stream channels.

## Rural electrification.

Government-financed rural electric power systems, most of them operated by farmers'cooperatives, are in 45 of the 48 States. These systems, built primarily to enable farm families to obtain central station electric service at rates and on terms they can afford, provide power also to many hundreds of small industrial plants, of which some produce essential defense materials while others process local raw materials.

As of September 30, 1940, the Rural Electrification Administration had in operation a total of 604 energized systems. These included 256,000 miles of lines and served 630,000 farm families and other rural users. It is expected that borrowers will complete construction of 70,000 miles of lines to serve 175,000 farm families and other rural users in the fiscal year 1941, construction financed out of 1941 funds but extending into future fiscal years is expected to add another 42,000 miles to serve 105,000 users. The R. E. A. expects to allot \$ 100,000,000 during the fiscal year, of this \$ 51,758,000 had been allotted by September 30, 1940.

## Agricultural credit.

Adequate credit facilities for agriculture at reasonable rates are an important part of the National Farm Program. These facilities contribute to the security of farm families, to the financial success of individual farms, and to the stability of farm communities. Farm financing through the Farm Credit Administration provides long-term and short-term loans to individual farmers, and credit to farmers'cooperatives and mutual companies. In 1940 farmers obtained \$ 460,000,000 of credit through the F. C. A. during the first 9 months of the year compared to \$ 416,000,000 in the corresponding period of 1939. A further increase is expected in 1941. There is a gradual increase in short-term loans to farmers by production credit associations and in financing by the banks for cooperatives. The downward trend in new financing which began in 1936 has been reversed.

## Impact of the war on agriculture in 1941.

In 1941 the war with its blockades and counter-blockades continued to hamper farm export trade, while the Government's defense program strengthened the farmers' domestic market. In the early months farm exports moved at a rate of scarcely more than one-third of the average for the five years that preceded the hostilities. Our cotton

exports were only about 15 per cent. of the pre-war volume and our tobacco and fruit exports in each instance only about 30 per cent. Exports of wheat and pork products were below the very low volume of the 1930' s. Under the Lend-Lease Act, however, the exports to Great Britain and to some other countries increased, and promised before the end of the year practically to double the monthly export volume. The defense program stimulated agriculture through its effect on industrial production, employment, and pay rolls. Along with the continued support afforded by the Government to the prices of depressed export commodities, it seemed likely to give agriculture a cash farm income for 1941 of about 10 5 billion dollars as compared with 9.1 billion dollars received in 1940.

Our defense policy, which included aid to Great Britain, improved the demand especially for livestock, dairy products, and certain fruits and vegetables. It was the main cause of a big rise in the national income, which at more than a probable 85 billion dollars for the year was up almost 11 billion dollars over the level of 1940. Economists expected that in 1942 the total would rise to 92 billions Taxes of course were higher; but consumers had left on the average about the same money income that they had in the pre-depression year 1929. The income of industrial workers, which in 1940 had been only 95 per cent. of the 1924-29 average, rose greatly, and for the fiscal year 1942 was expected to reach 126 per cent. of the 1924-29 average. Wages and pay rolls advanced sharply, living costs only moderately. As a result, the workers'standard of living was at a record level, and agriculture felt the benefit in higher prices for a long list of agricultural commodities. In mid-May the index of the prices of all agricultural commodities was 112, as compared with 98 in May, 1940, and with 100 for the period 1910-14

When the war began it did not seem that American agriculture would need to increase its output materially It had surpluses of cotton, wheat, corn, and tobacco, few apparent shortages, and small chance of getting more export trade. In 1941, however, the Government issued an urgent call for more commodities wanted in the domestic market and for export to Great Britain. It urged farmers to expand their acreage of soybeans and to take other precautions against a possible shortage of fats and oils. Also it drew special attention to the need for an increased production of hogs, of poultry and eggs, of cheese and evaporated milk, of dry edible beans, of tomatoes, and certain other truck crops. It guaranteed the prices of pork products, dairy products, and poultry products. On the other hand, it urged reduced production of cotton and wheat, for which crops it announced the minimum acreage allotments permitted under the Agricultural Adjustment Act and proposed legislation that would authorise additional curtailment in the acreages.

Agriculture felt the effect of priorities announced by the Government for the utilization of aluminum alloy steels and zinc. These commodities enter into the production of milking machines, poultry equipment, steel grain bins, and farm machinery generally. There was a possibility that nitrate fertilizers would have to be rationed; and that shipping priorities would seriously influence the supply and prices of copra oil, castor beans, tung oil, flaxseed, hides, wool, and many other items. In fact the ocean shipping situation seemed likely to affect farm-planning very broadly in the United States, chiefly toward the production of things usually imported or things capable of being substituted for imports.

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Prof. Ugo Papi, *Segretario generale dell'Istituto, Direttore responsabile.*

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AGRICULTURAL ECONOMICS AND SOCIOLOGY

# MONTHLY BULLETIN

OF

# AGRICULTURAL ECONOMICS AND SOCIOLOGY


## THE EFFECTS OF THE WAR UPON THE AGRICULTURAL SITUATION IN THE NON-BELLIGERENT COUNTRIES IN 1939-40 AND 1940-41.

By Dr. GEORGE PAVLOVSKY.

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## Preface.

Our last survey of the world agricultural situation covering the year 1938-39 closed on the very eve of the outbreak of the present war (¹). Since then, circumstances did not permit to continue our annual reviews of the conditions and tendencies of agriculture the world over. The economic factor acquired so great an importance in modern totalitarian warfare that information concerning economic conditions in the belligerent countries and their trade with the rest of the world became a secret hardly less closely guarded than their mobilization plans or other military information. Many data ceased to be published, and the war and blockade have made postal communications difficult and irregular, so that the periodical and other publications, especially from overseas countries, are not always available. Under such conditions, the preparation of our customary survey of the world agricultural situation became practically impossible and had to be suspended for the duration of the war.

As, however, the Institute, notwithstanding these difficulties, continued to work and to follow the developments which took place in the conditions of agriculture in the different countries, it was thought that a brief review of the principal trends of the agricultural situation at least in some parts of the world during the two years which elapsed since the beginning of hostilities—1939-40 and 1940-41—could and should be attempted. The limitations imposed on any such attempt by present-day circumstances are evident, so that it is hardly

(¹) *The World Agricultural Situation in 1938-39*, I. I. A., Rome, 1940.

necessary to stress here that the present sketch does by no means pretend to serve as a substitute to our usual annual survey. Too great are the lacunes in the available information, as well as in the number of countries which can be dealt with. Practically the whole of Europe has become gradually involved in the stupendous conflagration. The European situation, therefore, cannot be dealt with in any detail, which eliminates from our field of vision and study by far the greater part of the countries we have always been used to consider Several overseas countries of great agricultural importance are also involved in the war.

Yet, the development of the European war exercised a strong influence upon the non-belligerent countries in other parts of the world, and as these countries are mostly agricultural, the war and its accompanying blockade affected in the first instance their agriculture. The repercussions of the European war upon these countries are so important as to constitute a determining factor in their economic position and policy, national and international alike. Moreover, the developments which take place in the countries not directly involved in the conflict, are far more accessible to survey and investigation than would be those of the belligerent countries. Though even here our usual sources of information are not always regularly available, and are generally received with more or less considerable delays, they are at least not altogether lacking, as is often the case for European countries. Accordingly, even if we are not in a position to make our account as detailed and thorough as we should like, we can at least attempt a brief outline of the principal effects of the European war and of the blockade upon the conditions of agriculture outside Europe during the first two years of the conflict.

We shall start with an outline of Europe's part in world trade, and more particularly of her share in the absorption of agricultural products exported by non-European countries. This will help us to visualize the importance of the effects of the virtual isolation of the European continent, as a result of the war, upon the economic position of the agricultural exporting countries outside Europe. Then we shall deal with the effects of the war upon the United States and the Latin-American republics, and finally pass to those few countries of the Eastern hemisphere which are not directly involved in the European war. The most important group in this hemisphere, however, consists of the Far-Eastern countries which, though not involved in the European conflagration, are engaged in a long-drawn war of their own; a fact which, in this case, also does not permit of the situation being examined in detail. The situation of some other countries, such as Egypt and the other countries in the Near East, with the exception of Turkey, which, not being belligerent, are the theatre of military operations, excludes them from our survey altogether.

In an *Appendix* we give a brief note on world production of some of the principal agricultural commodities in 1939-40 et 1940-41, prepared by the Statistical Bureau of the Institute in very general terms, as the lacunes in the statistical data do not permit a more detailed account to be given.

## I Europe's share in the world's trade in agricultural products.

The outstanding economic effect of the war was seriously to interfere with the trade between Europe and the rest of the world. The declaration of war in September 1939 was followed by the application of blockade to each other's sea-borne trade by the belligerents. Moreover, the outbreak of hostilities in Europe brought about the immediate application by the United States of the Neutrality Act involving the exclusion of American shipping from the ports of the belligerent countries and the adjacent zones of the seas. Both parties began an active warfare against the sea-borne trade and the shipping of the other, while numerous ships were blocked in neutral ports and thus withdrawn from service. All this had exceedingly disturbing effects upon international trade, which was heavily reduced and disorganized. During the autumn of 1939 and the following winter, Germany's trade with overseas countries was practically brought to a standstill, while that of the United Kingdom and of France was greatly reduced and became subject to exceedingly heavy risks.

The blockade was greatly extended following the military developments of the spring and summer of 1940: the occupation by Germany of Denmark and Norway which automatically cut Sweden off ocean communications, and the conquest of Belgium, the Netherlands and France. All the occupied countries, now considered as belligerent territory, were included by Great Britain into the zone of blockade and became subject to the provisions of the American Neutrality Act. The Italian declaration of war in June 1940 brought Italy within the blockaded zone, while British shipping in the Mediterranean had practically to cease and the Suez canal was closed. The outbreak of the Italo-Greek war in October 1940, followed in the spring of 1941 by the occupation by German and Italian troops of Yugoslavia and Greece, led to the extension of the blockade to the Balkans. Thus in the spring of 1941, Europe, with the exception of the Hiberian Peninsula, Turkey and Finland, whose trade was also greatly reduced and strictly controlled with a view to avoiding leakage through neutral territories to the continental belligerents, and of Switzerland, wedged between belligerent countries and carrying amid great difficulties, a minimum of trade with the outside world, was practically completely isolated from economic intercourse with the outside world, and the outbreak, in June of the current year, of the war between Germany and the U. S. S. R. led to the cutting off of the last European overland economic connections with the East and the Pacific.

Apart from any effects the extension of the blockade may have had upon the economic situation in Europe, which we are not in a position to discuss here, these developments were bound to have serious repercussions upon the economic conditions of the other continents, and particularly upon their agriculture, largely dependent on Europe for the disposal of its products. In order more clearly to see these effects, we shall attempt to give here an approximate estimate of the part played by Europe in the world's trade in agricultural products on the eve of the present conflict.

With a population which, in 1938, accounted for 19 per cent. of the world's total population, and an area representing 4 per cent. of the world's surface,

Europe, exclusive of the U. S. S. R., was responsible, before the present war, for 51 per cent. of the total world trade, its share during the last few years being as follows [1].

*Europe's part in the world's total trade* (exclusive of U. S. S. R.).

| | 1925 | 1928 | 1932 | 1935 | 1938 |
|---|---|---|---|---|---|
| | Percentages of the value of trade | | | | |
| Imports | 55 | 55 | 58 | 56 | 56 |
| Expors | 45 | 46 | 49 | 46 | 46 |
| Total trade | 50 | 50.5 | 53.5 | 51 | 51 |

This total naturally comprises not only Europe's trade with other continents, but also the exchanges taking place between the various European countries. This intra-European trade represented considerably more than one half of the total, as is seen from the table below:

*Intra-European trade in per cent. of Europe's aggregate trade.*
(exclusive of the U. S. S. R )

| | 1925 | 1928 | 1931 | 1932 | 1935 | 1937 | 1938 |
|---|---|---|---|---|---|---|---|
| Imports | 52 | 54 | 60 | 54 | 54 | 51 | 52 |
| Exports | 65 | 64 | 69 | 66 | 64 | 63 | 64 |
| Total trade | 58.5 | 59 | 64.5 | 60 | 59 | 57 | 58 |

A large part of European trade was accounted for by the United Kingdom, so that one should make a clear distinction between the trade of Europe as a whole and that of the European continent, exlusive of the United Kingdom and Ireland. This distinction is particularly important in a study dealing with the economic effects of the present war and of the blockade. Accordingly, in the following table we shall give the absolute figures and the percentages of the share in the aggregate world trade of both Europe as a whole, including the United Kingdom and Ireland, and of the European continent only [2].

[1] In this and the following tables we have quoted or used for our calculations figures taken from the League of Nations' publication "*Le commerce de l'Europe*", Genève, 1941.

[2] The table has been calculated from figures contained in the League of Nations' publication quoted above.

*Share of continental Europe in world trade.*

(In milliards of U. S. dollars and in per cent.)

| | 1928 | | 1935 | | 1938 | |
|---|---|---|---|---|---|---|
| | $ | % | $ | % | $ | % |
| Total world trade | 58 83 | 100 | 20 73 | 100 | 24 20 | 100 |
| Total trade of Europe, excl of U S S R | 32 38 | 55 | 11 67 | 56 | 13 63 | 51 |
| Trade of Europe, excl of U S S R with other continents | 14 98 | 25 | 5 42 | 26 | 6 60 | 27 |
| Total trade of continental Europe | 23 03 | 39 | 8 04 | 39 | 9 23 | 40 |
| Trade between the countries of continental Europe | 11 53 | 19 | 4 14 | 20 | 4 86 | 20 |
| Trade of continental Europe with the rest of the world | 11 50 | 19 | 3 90 | 19 | 4 55 | 20 |

Incidentally, one of the most striking facts revealed by this table is the great stability of the percentages of European participation in world trade, in spite of the enormous variations in the total value of such trade due to the depression of 1929-32 and to later developments. This stability would appear to point to the essential nature of Europe's position as the world's economic

*Europe's share in the world's trade in certain agricultural products in 1935.*

| Products | Imports | | | Europe's share in world imports | |
|---|---|---|---|---|---|
| | World total | All Europe | Continental Europe (1) | All Europe % | Continental Europe % |
| | Millions of metric tons | | | | |
| Wheat and wheat flour | 17 8 | 11 36 | 5 20 | 66 1 | 24 7 |
| Maize | 9 10 | 7 56 | 4.24 | 83 1 | 46.6 |
| Sugar | 10 88 | 3 21 | 1 16 | 29 5 | 10.7 |
| Coffee | 1 65 | 0 69 | 0 67 | 41 9 | 40 6 |
| Cacao | 0 69 | 0 37 | 0 27 | 53 6 | 39.1 |
| Wool | 1 20 | 0 94 | 0 63 | 78 3 | 52 5 |
| Cotton | 2 91 | 1 84 | 1 27 | 63 2 | 43 6 |
| Rubber | 1 21 | 0 39 | 0 21 | 32.2 | 17.4 |
| | Thausands of metric tons | | | | |
| Tea | 419 | 254 | 26 | 60 6 | 6 2 |
| Butter | 616 | 571 | 81 | 92 7 | 13 2 |
| Eggs | 307 | 289 | 51 | 94.1 | 16 6 |
| Tobacco | 526 | 390 | 270 | 74.1 | 51.3 |

(1) Europe, exclusive of the United Kingdom, Ireland, Iceland, the Faroes, the Channel Island and Malta.

centre, a position which even very violent upheavals in the world's economic life and drastic changes in the trade policy of particular countries can do but little to change.

Passing now to Europe's part in the world's trade in agricultural products, we have the table on page 343.

The figures in the above table naturally include intra-European exchanges. Accordingly, when we have to consider the effects of Europe's isolation from intercourse with the other continents upon the agricultural situation in extra-European countries we must ascertain the distribution of her aggregate imports between the different sources of supply. This is given in the table below ([1]).

*Distribution of imports of certain agricultural products to continental Europe according to origin, in 1935.*

| Products | Imported from | | | | Total |
|---|---|---|---|---|---|
| | European countries, excl. of U. S. S. R. | British Dominions and India | European overseas possessions | Other countries | |
| | In percentages of total volume | | | | |
| Wheat | 25.2 | 18.2 | 11.2 | 45.7 | 100 |
| Maize | 28.7 | 2.8 | 12.6 | 55.9 | 100 |
| Sugar | 19.2 | -- | 32.3 | 48.5 | 100 |
| Coffee | 4.5 | 0.9 | 14.3 | 80.3 | 100 |
| Tea | 15.5 | 10.7 | 24.8 | 49.0 | 100 |
| Cacao | 8.3 | 0.3 | 75.8 | 15.6 | 100 |
| Tobacco | 38.2 | 0.3 | 24.3 | 37.2 | 100 |
| Wool | 17.6 | 56.5 | 0.8 | 25.1 | 100 |
| Butter | 98.1 | — | — | 1.9 | 100 |
| Eggs | 87.7 | - | 5.6 | 6.7 | 100 |
| Cotton | 7.7 | 13.5 | 4.3 | 74.5 | 100 |
| Rubber | 11.6 | 5.5 | 76.9 | 6.0 | 100 |

Considering these two last tables we can form a fairly clear idea of the importance of continental Europe's part in the world market of agricultural products. So far, we have approached the problem from the point of view of Europe as an importer of agricultural commodities. To see the effects of the blockade upon the non-European exporting countries, we calculated below the percentages of the total exports of some of the principal agricultural products from countries outside Europe to the European continent in 1935. Though such a calculation cannot obviously prêtend at being more than a rough appro-

([1]) Calculated from the statistics appearing in the League of Nations' publication quoted above.

*Estimated diminution of the agricultural exports of non-European countries as a result of the closing of the European markets.*

(calculated on the basis of 1935 figures).

| Products | Total exports by countries outside Europe | Total exports to Europe | Exports to continental Europe | Part of total exports going to continental Europe, in per cent. |
|---|---|---|---|---|
| | Millions of metric tons | | | |
| Wheat | 14.70 | 7.53 | 2.90 | 19.0 |
| Maize | 8.42 | 6.19 | 3.03 | 36.2 |
| Sugar | 9.74 | 2.49 | 0.57 | 5.9 |
| Coffee | 1.67 | 0.70 | 0.67 | 40.1 |
| Cacao | 0.74 | 0.36 | 0.27 | 36.5 |
| Wool | 0.93 | 0.82 | 0.46 | 50.0 |
| Cotton | 3.05 | 1.76 | 1.23 | 40.3 |
| Rubber | 1.13 | 0.33 | 0.22 | 19.6 |
| | Thousands of metric tons | | | |
| Butter | 314 | 203.1 | 1.5 | 0.5 |
| Eggs | 88 | 45.5 | 15.2 | 17.3 |
| Tea | 430 | 245.7 | 26.9 | 6.3 |
| Tobacco | 425 | 284.4 | 119.7 | 28.2 |

ximation, it may give some idea of the effects of the war upon the trade of the agricultural exporting countries in the other continents.

From the point of view of international trade in agricultural products, the year 1935 was a fairly representative one for a period in which the various regulations and restrictions due to the depression and to the accentuation of autarchic tendencies had already assumed definite shape. While, therefore, the percentages for 1935 do not necessarily and exactly hold good for any other year, they may be taken to represent with sufficient approximation the extent of the losses suffered by inter-continental trade in the principal agricultural products as a result of the isolation of continental Europe from the world market.

The large percentages of the total world exports of agricultural products which used formerly to go to continental Europe, some of which are shown in the above table, have now been blocked, and unless they found new markets, they had to be written off as loss.

The loss of exports suffered by the agricultural exporting countries outside Europe, following the practically complete isolation of the European Continent, on the basis of the figures just given may be put at about 19 per cent. for wheat, 36 per cent. for maize, 40 per cent. for coffee, 36 per cent. for cacao, 50 per cent. for wool, 40 per cent. for cotton, 20 per cent. for rubber, 17 per cent. for eggs and 29 per cent. for tobacco, to take only those commodities in which the diminution was greatest.

## II. The Western Hemisphere: United States.

Agricultural conditions in the United States on the eve of the present war were far from satisfactory, even if the recession which marked the year 1937-38 and still affected the situation in 1939, had become less pronounced. Of lasting improvement, based upon an expansion of demand at home and abroad, there have been no signs. From the monthly returns of cash receipts of farmers from the sale of agricultural products, the cash farm income for 1939 was expected to fall to a figure below that of 1938, which was again lower than that of the two preceding years, 1936 and 1937. During the autumn of 1939, however, the war in Europe changed the situation of some at least of the agricultural markets in the United States to such an extent, as to make these expectations far too pessimistic.

Combined with the gradual extension of the United States' own rearmament programme, the prospects of heavy demands for foodstuffs and certain raw materials on the part of Great Britain and France, which were envisaged as likely to develop more or less along the same lines as in 1914-18, caused a rise in agricultural prices, in which, however, during these early months, speculative factors were probably more important than the influence of current effective demand. The result was that, at the end of 1939, the cash farm income in the United States, originally estimated provisionally at 7,900,000,000 dollars, of which 7,225,000,000 from marketing and 675,000,000 from Government payments under the A. A. A., actually proved to amount to 8,500,000,000 dollars. At the time, this improvement was based largely on expectations of an export boom, which would affect agriculture both directly, through increased foreign demand for its products, and indirectly, through a rise in employment in the export industries, and a consequent expansion of domestic purchasing power. As the war went on some of these expectations were disappointed, while others, on the contrary, not only have materialized, but have even been exceeded.

The factors which came into play were the following.

In the first instance, the war, which, during the autumn and winter 1939-40, had been surprisingly static and uneventful, assumed an unexpected turn in the spring of 1940. The occupation of the Scandinavian countries, and the collapse of the Netherlands, Belgium and France, followed by the Italian declaration of war and the consequent extension of the blockade and intensification of ocean warfare against mercantile shipping, had a strong restrictive effect upon American foreign trade. Indeed, American exports, except for the relatively small trade with the Balkans and the Hiberian Peninsula, were now practically restricted to the United Kingdom; and even here, tonnage and financial considerations were bound to keep them within the limits of the absolutely indispensable for life and warfare.

Another factor, which tended to enhance the influence upon the agricultural situation of internal economic developments, as compared with that of foreign trade, was the expansion of the armament industries for the United States' own defence needs, as well as for export, mainly to the United King-

dom. This expansion, which had been going on for some time, assumed particularly vast proportions since the autumn of 1940, when, after the collapse of France, American assistance to Great Britain was greatly extended, and the rearmament programme was pressed forward. As this development went on, and industrial expansion gained ground, absorbing unemployed hands and swelling the payrolls, domestic demand for agricultural products tended to increase and agricultural prices and farmers' incomes rose, even if, as the process developed, some of the increase in prices was cancelled out by a simultaneous increase in the cost of production.

To these basic factors of the situation should be added such other influences, as the structural changes in the economic system of the United States, provoked or accelerated by the war, the development of United States economic activities in Latin America, and many other factors, both domestic and international, among which the inflationary effects of an industrial boom resting on armament work upon the monetary and price systems should not be overlooked.

**Foreign trade.**

As war broke out, it was expected to have a stimulating effect not only upon the industrial exports of the United States, but upon her agricultural exports as well, just as did the war of 1914-18. Industrial exports were expected to go in great quantities both to Europe, to supply the armament needs of Great Britain and France, and to those parts of the world which, having their supplies of European manufactured goods reduced or stopped by the war, would have to turn to American products. Agricultural products would be needed by the European belligerent countries, and the United States would be the country best able to meet the demand, as it did during the preceding great war. Indeed, Great Britain and France, in a war which, *mutatis mutandis*, was envisaged as roughly repeating that of 1914-18, were expected to be largely dependent upon American foodstuffs and other agricultural products. In the autumn and winter of 1939-40 this view of the situation was so widely held, and appeared so well founded, that it caused a certain buoyancy on the American agricultural markets, and forced the Federal Government repeatedly to warn the farmers not to allow themselves to be carried away by excessive optimism into an unreasonable expansion of production, lest they should repeat the painfull experience of the years following the last war and culminating in the great depression.

The war, however, took a turn wholly different from expectations and, at the end of the first year of hostilities, led to the almost complete isolation of the European continent from overseas trade. It cannot, though, be said, that American expectations were entirely disappointed, as, in spite of the blockade, the United States' trade with Europe had actually increased in 1940, compared with 1939, owing to the doubling of the value of exports to the United Kingdom. So did also the United States trade with Latin America, even if it failed to justify the expectations of optimists, because the curtailment of their exports to Europe naturally reduced the importing capacity of the Latin-American republics.

The regional distribution of American foreign trade in 1940, compared with 1939, was as follows:

*Distribution of U. S. foreign trade according to continents.*
(millions of dollars)

| | Exports | | Imports | |
|---|---|---|---|---|
| | 1939 | 1940 | 1939 | 1940 |
| Europe | 1,290 | 1,645 | 617 | 390 |
| Northern North America | 498 | 726 | 349 | 437 |
| Southern North America | 304 | 341 | 231 | 256 |
| South America | 329 | 436 | 317 | 395 |
| Asia | 561 | 619 | 700 | 981 |
| Oceania | 80 | 94 | 27 | 35 |
| Africa | 115 | 161 | 77 | 131 |
| Total | 3,177 | 4,022 | 2,318 | 2,625 |

Among the principal changes the following should be noted. Exports to the United Kingdom increased from 505 to 1,010 million dollars, and to France from 182 to 252 million dollars, all the increase in the latter case being naturally accounted for by the first six months of 1940. Exports to Germany fell from 66 to 0.1 million dollars, and to Italy from 59 to 51 million dollars.

The development of the foreign trade of the United States during the period under review is well illustrated by the table on page 349 giving the index numbers of the quantities, unit price and total value of United State's exports and imports according to groups of commodities.

An examination of this table suggests the following observations concerning the different groups of commodities exported and imported by the United States during the last three and a half years.

In the exports of *crude materials* there has been a headlong decline due to the combined effects of the industrial expansion in the United States in connection with the defence programme, and of the closing of European continental markets. The imports of crude materials, on the other hand, have been increasing continually, such increase having been due partly to increased industrial consumption in America, and partly to the diversion by the exporting countries to the United States of a large part of their surplus of primary products for which no other outlets could be found. It is precisely the pressure of these additional supplies that accounts for the fact that, in spite of the great increase in the demand for industrial raw materials and other primary products due to the war, the prices of these commodities in the United States, as well as on what is still left of the world market, have risen relatively but little.

The exports of *crude foodstuffs* have also been falling continuously, but export prices, from 1939 on, have been rising, the decline in exports being

*Index numbers of quantity, prices and total value of United States exports and imports.*

(1923-25 average 100)

| | Exports | | | | Imports | | | |
|---|---|---|---|---|---|---|---|---|
| | 1938 | 1939 | 1940 | Jan - June 1941 | 1938 | 1939 | 1940 | Jan - June 1941 |
| *Crude materials.* | | | | | | | | |
| quantity | 95 | 86 | 71 | 37 | 84 | 99 | 122 | 152 |
| price | 47 | 46 | 48 | 51 | 47 | 51 | 56 | 56 |
| value | 45 | 40 | 35 | 19 | 39 | 51 | 69 | 85 |
| *Crude foodstuffs* | | | | | | | | |
| quantity | 148 | 79 | 45 | 32 | 113 | 128 | 130 | 165 |
| price | 52 | 44 | 51 | 54 | 54 | 53 | 51 | 57 |
| value | 77 | 34 | 23 | 17 | 61 | 68 | 67 | 93 |
| *Manufactured foodstuffs and beverages* | | | | | | | | |
| quantity | 47 | 55 | 45 | 47 | 139 | 144 | 132 | 153 |
| price | 68 | 63 | 65 | 71 | 47 | 46 | 44 | 46 |
| value | 32 | 35 | 29 | 33 | 66 | 67 | 59 | 70 |
| *Semi-manufactures* | | | | | | | | |
| quantity | 106 | 129 | 180 | 132 | 79 | 100 | 102 | 116 |
| price | 78 | 75 | 82 | 88 | 69 | 69 | 77 | 80 |
| value | 83 | 101 | 148 | 117 | 55 | 69 | 79 | 92 |
| *Finished manufactures* | | | | | | | | |
| quantity | 137 | 151 | 195 | 245 | 92 | 98 | 82 | 77 |
| price | 68 | 67 | 73 | 72 | 60 | 59 | 66 | 66 |
| value | 93 | 102 | 142 | 176 | 55 | 58 | 54 | 51 |

accounted for by the closing of European markets, while the prices have been supported by the increase in domestic demand due to industrial expansion and to increased purchasing capacity in the United States. The imports of crude foodstuffs have been increasing all through, the rise being particularly marked in 1941, under the influence of the American defence programme and of shipments to Great Britain. Import prices, however, have been on the decline, owing to the depressed condition of the markets in the exporting countries, and it was not until the end of 1940 and the first half of 1941 that they showed signs of improving, owing to increased purchases by the United States and Great Britain.

The exports of *semi-manufactures* increased greatly in 1940, largely owing to the laying-in of emergency stocks by various European countries during the first half of the year, before the military events changed the whole situation completely. After that, at the end of 1940 and in 1941, they diminished considerably under the combined influence of the needs of the expanding armament industries in the United States and of the elimination of continental European demand. The prices increased but little, their rise being damped

by the disappearance of the formerly active European markets. Imports of semi-manufactures, on the other hand, have been increasing continually, and their prices have been steadily rising.

The exports of *finished manufactures* reflected the effects of the war upon American trade more clearly than those of any other group of commodities, as under this head came all the shipments of arms and ammunition to Great Britain under the programme of assistance, as well as many other similar exports. Here, the export figures rose rapidly. The imports of finished manufactures, most of which, in the past, used to come from Europe, and largely consisted of what may be called « luxury goods », have naturally diminished greatly.

The increase in the value of exports was accounted for mostly by industrial products and certain raw materials. Indeed, comparing the figures of the United States exports in 1939 and 1940 according to the principal classes of commodities, we have the following table:

| | 1939 | 1940 |
|---|---|---|
| | millions of dollars | |
| Total exports | 3,123.87 | 3,934.08 |
| Of which: | | |
| Iron and steel | 254.79 | 533.84 |
| Non-ferrous metals | 151.85 | 212.11 |
| Aircraft | 116.91 | 311.76 |
| Arms and munitions | 5.02 | 64.16 |
| Explosives | 5.00 | 20.87 |
| Agricultural products | 633.72 | 492.15 |

During the first year of the war, from September 1939 to August 1940, the American exports of specified agricultural commodities, compared with those of the preceding twelve months, were as follows:

*Exports from the United States of specified agricultural commodities during the years 1938-39 and 1939-40.*

| Products | Unit | 1938-39 | 1939-40 |
|---|---|---|---|
| | | millions of units | |
| Pork | Lb | 122,175 | 120,500 |
| Lard | » | 263,932 | 247,037 |
| Wheat | Bu | 107,555 | 44,731 |
| Apples | » | 12,035 | 2,920 |
| Pears | » | 160,047 | 73,311 |
| Tobacco | Lb | 447,285 | 301,548 |
| Cotton | Bales (500 lb) | 3,527 | 6,374 |

The decline in agricultural exports became particularly pronounced during the second half of 1940, and does not accordingly appear in the above table. It is clearly seen when comparing the figures for the autumn months--September to November—of 1939 and 1940. The export figures of these months, during which almost the whole of the European market was already closed to overseas trade, show a spectacular fall. Thus, the figures for pork fell from 23,065,000 lb. in September-November 1939 to under a half of this figure: 11,059,000 lb. during the corresponding period of 1940, for lard—from 69,491,000 lb. to 30,383,000 lb; for wheat—from 14,477,000 to 11,536,000 bushels; for apples—from 1,715,000 to 323,000 bushels, for pears—from 52,222,000 to 9,004,000 bushels, for tobacco - from 98,440,000 to 25,133,000 lb, and for cotton from 2,236,000 to 457,000 bales. Indeed, during the to first years of the war, American exports of cotton were estimated to have diminished about 85 per cent., and those of tobacco and fruit about 70 per cent., while the exports of wheat and pork products fell below the lowest records of the period of depression. In the course of 1941, owing to the great extension of American assistance to Great Britain, the export situation has somewhat improved, especially for meat, dairy products and certain fruits and vegetables, of which large quantities are being shipped to the United Kingdom

## Geographical shifts of industries.

Among the long term developments stimulated by the war and the expansion of armament industries, as well as of other branches of production essential for warfare, one should note the marked shifting of the centre of gravity of the industrial structure of the United States westwards. The westward trend of industry has always been characteristic of American economic development, which began in the Eastern States and then spread to the Middle West, with Chicago as centre From there, it proceeded westwards, towards the Pacific coast, which has been of late increasingly industrialized, and towards the predominantly agricultural South. This evolution was of late greatly accelerated by the expansion of armament industries, even if it has sometimes to overcome certain difficulties, mostly due to the shortage of trained labour in these regions. From the agricultural point of view, this development is important as it tends to create local demand for agricultural products in the Pacific States, in which the disposal of the surplus of local production has for years been a serious problem, as well as to relieve the pressure of agricultural population in those localities of the South, such as the so-called Dust Bowl, in which soil erosion has greatly reduced the yield in many a district.

## Agricultural policy.

It should be said in this connection that the agricultural policy of the Federal Government has not undergone any drastic modifications under the influence of the war. The general policy based upon the A. A. A. of 1938 remains essentially unaltered, with acreage allotments fixed for the principal products, commodity loans, crop insurance etc., and the various measures for the absorption of sur-

pluses. Any encouragement of production is done with great circumspection, so as, while ensuring the necessary supplies for the home market and for export, to prevent the repetition of an uncontrolled expansion which would unavoidably end in disaster.

**Domestic agricultural situation.**

The agricultural situation in the United States, in spite of the diminution of exports during the first half of the year, could be described as generally satisfactory. This was due in the first instance to the expansion of industrial activity caused by the defence programme and the greatly increased demand from abroad for armaments, raw materials and manufactured goods. The armaments factor has been in operation for some time before the outbreak of the war, but then its positive effects were but slight, as industrial expansion at that time only succeeded in absorbing a fraction of the idle hands and other resources. The intensification of defence activities after the war began, and the pressure exercised upon the industry by the extension and acceleration of the defence programme in the autumn of 1940, have considerably increased employment, raised the earnings of the masses and led to en expansion of domestic demand for foodstuffs and other articles of consumption.

The index numbers of industrial production (1935-1939=100) rose from 88 in 1938 to 108 in 1939 and 122 in 1940. During 1940 the rise was particularly marked in the second half of the year, reaching 138 in December, and in 1941 it has continued, the index for the first quarter of 1941 being 141. The index of the income of industrial workers (1924-29 = 100) rose from 73 in 1938 to 84 in 1939, 95 in 1940 and 112 for the first quarter of 1941.

The effects of increased purchasing power in the hands of the consumers upon the prices of most agricultural products could be clearly discerned, and this helped to overcome the depressing influence of diminishing exports. According to groups of commodities, the index numbers of prices were as follows:

*Index numbers of prices of agricultural products.*

(1909-1914 = 100).

| Years | Grains | Cotton & cotton seed | Fruits | Truck crops | Meat animals | Dairy products | Chickens & eggs | All groups |
|---|---|---|---|---|---|---|---|---|
| 1937 . . . . . . . . | 126 | 95 | 122 | 123 | 132 | 124 | 111 | 121 |
| 1938 . . . . . . . . | 74 | 70 | 73 | 101 | 114 | 109 | 108 | 95 |
| 1939 . . . . . . . . | 72 | 73 | 77 | 105 | 110 | 104 | 94 | 93 |
| 1940 . . . . . . . . | 85 | 81 | 79 | 114 | 108 | 113 | 96 | 98 |
| 1941 (Jan.-May) . . . | 86 | 86 | 84 | 143 | 133 | 120 | 98 | 106 |

It is seen how particularly marked was the advance in the prices of vegetables, meat animals and dairy products. In the case of vegetables it was mainly accounted for by the expansion of domestic demand, while the sharp rise in the prices of meat animals in 1941 must have been largely due to the adoption by the Government of guaranteed pig prices as a means of increasing production

for exports to Great Britain. Naturally, in discussing prices, it is always necessary to bear in mind the effects upon them not only of changes in effective demand, but also of the various measures of control such as commodity loans, the operations of the Surplus Commodity Corporation, food stamp plans etc., so that the explanation of price movements is not simple

Among the factors of the agricultural situation in the United States we should point out the unavoidable inflationary influence of an expansion of economic activity essentially based upon the production of armaments and of manufactured goods intended for export, which, accordingly, do not appear on the domestic market as a counterpart to the additional purchasing power created by the expansion of industrial activity In the course of the last two years the United States naturally could not escape the effects of this creation of fresh purchasing power, which, as we have had occasion to see, was the principal cause of the improvement of domestic demand for agricultural products and of their prices At the same time, the real role of the inflationary tendencies, generated by the armament boom, should not be exaggerated.

Indeed, the American economic system, in spite of all the efforts of the Federal Government to revive its activity, had worked for years under very low pressure, so that all the essential factors of production have been only partly occupied The capital and short-term money markets had a surfeit of funds at their disposal, and the rates of interest and discount were exceedingly low The country had a large army of unemployed, numbering about 11 or 12 millions and at the worst moments up to 13 millions. The great industries worked at hardly half their capacity. The consumption of foodstuffs and of manufactured goods had for years been keeping below normal. In other words, before an expansion, even if, as is the case in any expansion caused by unproductive expenditure, it was inflationist by its very nature, could produce inflation, it had to take in the slack in the economic system and bring its tension up to the normal pitch

Under the special conditions created by the present war, this resistance to inflationary influences was, moreover, increased by the diminution in agricultural exports and by the shrinking of European demand for numerous primary products which found their way to the United States, thus creating that counterpart to the addition in purchasing power in the American economic system which was needed to keep inflation in check.

As a result, the inflationary tendencies, though undoubtedly present in the United States' economic system, could not be said to have exercised any marked influence upon the economic situation during the first two years of the war. It should, however be said that signs of inflationary developments have been appearing more clearly since the autumn of 1940, with the expansion and acceleration of the armament programme.

The cost of living index of the Bureau of Labor Statistics (1924-29 = 100), remained remarkably stable. From 80 in 1939 it rose to 81 in 1940 and remained at this figure throughout 1940 and until March 1941, when there was a rise to 82.

As far as the farmer was concerned, his costs of living and of production have not risen generally to any considerable extent. The Bureau of Labor Statistics index of wholesale prices of all commodities (1926 = 100) rose from 113 in 1939 to 115 in 1940. There was an acceleration in the rise in the later part of 1940 and in 1941 it continued, the index for the first five months of the year being 120. The index of prices of goods bought by the farmers (1911-14 = 100) rose for household goods from 120 in 1939 to 121 in 1940 and to 124 in March 1941. That of his means of production increased from 122 in 1939 to 124 in 1940 and 125 in March 1941. For both groups, household and production goods, the index numbers were 121 in 1939, 123 in 1940 and 124 for the first five months of 1941.

Somewhat more marked was the rise in farm wages, the index (1910-14 = 100) increasing from 123 in 1939 to 126 in 1940. In January 1941 it registered a decline to 124 but only to rise in March 1941 to 138. Here naturally, as in the case of the means of production whose supply was beginning to feel the effect of the armaments competition for materials, the rise was due not to monetary causes but to the competition for hands on the labour market, more especially in those districts where new industrial plants have been launched. The ratio of prices received to prices paid by the farmers, which was 77 in 1939, rose to 80 in 1940 and to 86 for the first five months of 1941, thus moving distinctly in favour of agriculture.

The cash income of the farmers in the United States increased in 1940, compared with the two preceding years, nearly reaching the high total of 1937. According to the principal sources, the evolution of farmers' cash income from 1937 to 1940 was as follows:

| Sources | 1937 | 1938 | 1939 | 1940 |
|---|---|---|---|---|
| | Millions of dollars | | | |
| Crops | 3 878 | 3 126 | 3 238 | 3 504 |
| Livestock | 4 866 | 4,403 | 4 495 | 4 824 |
| Government payments | 367 | 482 | 807 | 766 |
| Total | 9 111 | 8 072 | 8 540 | 9,094 |

No estimate of cash farm income for 1941 is at present available, but according to a recent calculation (July 1941) it is expected to total about 10,500,000 dollars.

## Summary.

Summing up what has just been said about the effects of the war upon the agricultural situation in the United States during the years 1939-40 and 1940-41, we can say that:

(1) The rapid extension of the zone of blockade to practically the whole European continent following the military events of the period between

the spring of 1940 and the summer of 1941, falsified the expectations of those who anticipated the repetition in the course of the present war of the wave of war-time prosperity in the non-belligerent countries exporting foodstuffs and other agricultural products, which distinguished the war of 1914-18.

(2) Accordingly, after a brief spell of optimistic buoyancy on the agricultural markets in the United States at the beginning of the war, it was found that agricultural exports, instead of increasing, registered a considerable decline, any increase in trade there being wholly accounted for by armaments and other industrial exports, mainly serving for purposes of warfare.

(3) If, in spite of the decline in agricultural exports, the agricultural situation in the United States had actually improved during the two years under review, this improvement has been entirely due to the expansion of domestic demand. This latter was caused by the increase in the purchasing capacity of the consumers as a result of the expansion of industrial activity in connection with the American defence programme and the extension of assistance to Great Britain.

(4) The agricultural policy of the Federal Govenements has remained essentially unchanged, on the basis of the Agricultural Adjustment Act of 1938, and whatever has been done to increase the production of certain agricultural commodities, has been done with great circumspection, so as to avoid the repetition of the over-expansion which had taken place during the war of 1914-18 and its evil effects.

(5) An important aspect of the economic evolution of the United States during the period under review was the marked acceleration in the industrial development of the Western and Southern States, in which the building-up of new industrial plant is making rapid progress. Such an industrialization of the formerly almost entirely agricultural regions of the United States is bound to have important economic consequences for the agriculture of these States by increasing the capacity of local markets for agricultural products in the West and by relieving the excessive pressure of agricultural population on the soil-eroded land of some parts of the South.

(6) In the economic position of the farmers, as well as in the general economic situation in the United States, inflationary factors, though undoubtedly present, have not so far made themselves felt to any considerable extent, owing to the state of low pressure under which American economy has been living for years. Only since the autumn of 1940 clear signs of incipient inflationary tendencies have begun to appear.

(7) The economic position of farmers in the United States during the two years under review had improved considerably, their cash receipts, including Government payments, having been estimated at 9,094 million dollars in 1940, as against 8,540 million dollars in 1939, 8,072 million dollars in 1938 and 9,111 million dollars during the boom year 1937. For 1941 they have been provisionally estimated at 10,500 million dollars.

## III. The Western Hemisphere: Latin America.

### The orientation of the foreign trade of Latin America on the eve of the war.

Latin America is mostly visualized as a sort of natural bloc, presenting a certain degree of uniformity with regard to the rest of the world. According to this common view, it constitutes a typical example of a group of countries, still but little developed economically and wholly dependent upon the Old World for the disposal of that surplus of primary products by which alone they can pay for their necessary imports of consumer's goods and of means of production. In discussing the effects of the war now being fought in Europe upon the economy of Latin America, we are generally, accordingly, inclined to treat the problems of this part of the world rather too summarily, which unavoidably leads to certains errors. Before attempting to outline here the effects of European war and blockade upon Latin America, we should, therefore, try to gain closer insight into the economic bonds between the Latin-American Republics and various other countries or groups of countries, as they appear from the statistics of their foreign trade. In view of the special situation created by the war, in dealing with the distribution of the foreign trade of the Latin-American countries with their various partners, we shall consider their trade with the United States, with the United Kingdom, with Germany and other European continental countries and with the rest of the world in 1938, the last year before the war.

In the following examination we limit ourselves for obvious reasons to the principal trading partners, leaving aside those countries whose share in the trade was insignificant. In the aggregate, the countries we specify account for a large percentage of the total trade of the respective Latin-American Republics, varying for imports from 69 to 96 per cent. (except in the case of Uruguay with 56.5 per cent.), and for exports from 55 to 95 per cent.

As we are not in a position to present the situation in a satisfactory way in the form of a statistical table, our readers will have to resign themselves to following a somewhat monotonous exposition of numerical data referring to the different countries of Latin America.

*Argentina*, in 1938, drew 17.6 per cent. of her imports from the United States, 17.7 per cent. from the United Kingdom, 9.8 per cent from Germany, 5.4 pr cent. from Italy, 5 per cent. from Belgium, 4.2 per cent. from France, 4.2 per cent. from India and 4.6 per cent. from Brazil. Thus, taking only the largest specified importers, continental Europe supplied 24.4 per cent. of the total, while the largest single contribution coming from within the Latin-American group —that of Brazil— was only 4.6 per cent. Of the Argentine exports, the United States took only 8.4 per cent. while 32.8 per cent. went to the United Kingdom, 11.8 per cent. to Germany, 7.4 per cent. to Belgium, 7.3 per cent. to the.Netherlands and 5.3 per cent. to France, thus making for the specified continental European countries a total of 31.8 per cent. Within the Latin-American group, the largest buyer was Brazil, with 7 per cent.

Of *Bolivia's* total imports 25.5 per cent. came in 1938 from the United States 17.9 per cent. from Germany, 12.9 per cent. from Argentina and 12.9 per cent. from Peru. Of her exports, 4.6 per cent. went to the United States, 62.5 per cent to the United Kingdom, 21.7 per cent. to Belgium and 4.6 per cent to the Netherlands.

In *Brazil*, in 1938, the United States accounted for 24.4 per cent of the total imports, the United Kingdom for 10.3 per cent., Germany for 24.9 per cent., and Argentina for 10.3 per cent. Of the Brazilian exports the United States took 28.7 per cent., the United Kingdom 7.3 per cent, Germany 15.9 per cent. and France 4.1 per cent.

In *Chile*, the United States in 1938 accounted for 27.7 per cent. of the total imports the United Kingdom for 10,5 per cent, Germany for 25.7 per cent and Peru for 5.8 per cent At the same time 14.9 per cent of Chilean exports went to the United States, 22.7 per cent to the United Kingdom, 10.1 per cent. to Germany and 7.8 per cent. to Belgium

*Colombia* in 1938 drew 51,2 per cent. of her total imports from the United States, 12.3 per cent from the United Kingdom, 17.3 per cent from Germany and 3.4 per cent from France The United States took 52.7 per cent of her exports, while the share of the United Kingdom was insignificant, 14.9 per cent. went to Germany, 4,6 per cent to France and 9,7 per cent to Canada.

*Costa Rica's* imports in 1938 came up to 48.9 per cent. from the United States, 7.2 per cent. from the United Kingdom, 19,7 per cent. from Germany and 6.2 per cent from Japan Of her exports 45.6 per cent went to the U. S. A., 24,4 per cent. to the United Kingdom 19.1 per cent to Germany and 2.5 per cent. to the Netherlands.

*Cuba's* trade was mostly with the United States Thus, in 1938, of her imports 70.8 per cent. came from the U. S. A., 4.2 per cent. from the United Kingdom, 4.3 per cent. from Germany and 1.9 per cent from Thailand Of her exports, the United States took as much as 75.9 per cent, the United Kingdom 13.7 per cent, Germany 1.0 per cent and France 1.3 per cent

*Ecuador's* imports in 1938 came up to 34.6 per cent. from the United States, 7.9 per cent. from the United Kingdom, 19.9 per cent. from Germany and 7.4 per cent. from Japan. Of her exports 37.9 per cent. went to the United States, 4.7 per cent. to the United Kingdom, 21.1 per cent. to Germany, 8 per cent to France, and 7.3 per cent. to Peru.

*Haiti*, for which our figures refer to the year 1938-39. took 62.2 per cent. of her imports from the U. S. A., 11.1 per cent. from the United Kingdom, 2.7 per cent from Germany and 4.9 per cent. from France. Of her exports 34.4 per cent. went to the U. S. A., 19 per cent. to the United Kingdom, 20.9 per cent. to France and 3.1 per cent. to Belgium.

*Mexico* in 1938 obtained 57.6 per cent. of her imports from the United States, 4.1 per cent. from the United Kingdom, 20.2 per cent. from Germany, 4.0 per cent. from France, 2.3 per cent. from Sweden, 1.9 per cent. from Italy, 1.6 per cent. from Switzerland and 1.4 per cent. from Belgium, the 6 abovementioned European countries accounting together for 31.4 per cent. of her total imports; 1.4 per cent. came from Canada and 1.8 per cent. from Japan. Of

the Mexican exports, the United States took 69.1 per cent., the United Kingdom 9.2 per cent., Germany 7.9 per cent., Belgium 4.8 per cent., France 2.3 per cent. and the Netherlands 2.0 per cent., these four continental Europeen countries together being responsible for 17 per cent. of the total exports.

*Paraguay* in 1938 got 9.5 per cent. of her imports from the United States, and an equal percentage from the United Kingdom, 11.4 per cent. from Germany, 38.2 per cent. from the Argentine and 14.9 per cent. from Japan. Of her exports, 12.1 per cent. went to the United States, 13 per cent. to the United Kingdom, 14.2 per cent. to Germany and 22.1 per cent. to the Argentine. Accordingly, in the trade of Paraguay, as in that of Bolivia, the two inland South-American countries having no direct access to the sea-shore, intra-Latin-American exchanges played a particularly important role, owing to re-exports on the part of the neighbours

Of the total imports of *Peru* 33.9 per cent came in 1931 from the United States, 10.1 per cent. from the United Kingdom, 20.3 per cent. from Germany and 6.1 per cent from the Argentine Of her exports, the United States took 26.8 per cent, the United Kingdom 19.9 per cent, Germany 10.5 per cent, France 6.3 per cent., Canada 6.3 per cent, and Chile 6.1 per cent

*Uruguay* obtained 12 per cent. of her total imports in 1938 from the United States, 19.9 per cent from the United Kingdom, 16.9 per cent from Germany and 7.7 per cent from Brazil. Exports to the United States were insignificant while 26 per cent. went to the United Kingdom, 23.5 per cent. to Germany, 7 4 per cent to France and 9 5 per cent. to the Argentine

For *Venezuela* we have data referring to the year 1937. In that year, 51 6 per cent. of that country's imports came from the United States, 9.1 cent. from the United Kingdom, 13.3 per cent. from Germany and 5.6 per cent from Belgium. Of her exports 13.4 per cent. went to the United States, 5.3 per cent to the United Kingdom, 2.4 per cent. to Germany and by far the largest part. 70.8 per cent. to the Dutch West Indies.

The above picture of the share of different countries in the foreign trade of the Latin-American Republics during the last full calendar year before the outbreak of the present war, though naturally subject to variations from year to year, gives on the whole a sufficiently true idea of the situation and permits certain observations to be made, which are highly relevant to the subject of our inquiry. These observations are as follows:

(1) In spite of the fact that, in the course of the last few years, Latin America, like many other countries, has been feeling the influence of the modern tendency towards bilateralism, on the whole its foreign trade has been predominantly based on triangular exchanges.

(2) In the distribution of trade between the different partners there would appear to exist a fairly pronounced geographical factor, the gravitation towards the United States being particularly marked in the case of the countries of Central America and of the northern parts of the South-American Continent. Thus, in the case of Columbia, Costa Rica, Cuba, Haiti, Mexico and Venezuela 50 and more per cent. of the total trade is with the United States; while further

afield, towards the South, the American share diminishes, yielding place to the United Kingdom, Germany and, though in a far smaller volume, to other European countries. Accordingly, the disapperance of continental Europe from the market, caused by the war, would appear to be a factor of greater importance for the countries of the Southern part of Latin America, than for those of its northern and central parts.

(3) In the total trade of Latin America, intra-continental exchanges generally played, before the present emergency, an exceedingly small part, save for few exceptions in the case of neighbouring countries. This is only natural, considering the character of the economy of most Latin-American countries, distinguished by considerable uniformity and not yet sufficiently developed in its various branches, and it emphasizes the great difficulties encountered by the policy of achieving a higher degree of continental self-sufficiency which has lately been energetically pursued. It would appear that only by a great development of industry, based upon the natural wealth of Latin-American countries, upon a liberal immigration policy and a large influx of capital, can a transformation be achieved which will enable intra-continental trade to acquire a really decisive importance.

(4) The trade with the United Kingdom in 1938, as in the course of the previous few years, felt the effects of the Ottawa policy of imperial preferences, and was, accordingly, somewhat below capacity. This means that, provided that means of financing purchases and of transport were available, war-time requirements may have had the effect of increasing British purchases, and thus at least partly making good the losses caused to the Latin-American countries by the shutting-off of continental Europe. The British-Argentine agreement of October 1940 providing for a large purchase of foodstuffs in the course of the following twelve months, has probably had the effect of increasing the share of the United Kingdom in Argentina exports, the payment being effected by the transfer of British-owned Argentine securities.

(5) Latin America's trade with the British Dominions and Colonies, before the war, was very small, largely owing to the fact that the Dominions' economy was essentially competitive to that of the Latin-American countries. Canada figured among the customers of some of these countries to a limited extent, and India was responsible for 4.2 per cent. of Argentina's imports in 1938. The war may have increased some of these exchanges by the shifts in transport facilities and in price relations.

(6) Japan's trade with Latin America has been on the increase during the last few years, but it still represented in 1938 a small proportion of the imports and exports of Latin America. This may, however, have increased owing to the repeal of the commercial treaty with the United States in 1940.

**Changes brought about by the war in the economic situation of Latin America.**

The principal changes in the economic situation of Latin America brought about by the war and the gradual extension of the blockade to practically the whole of the European continent consisted in the closing of outlets for exports,

*Foreign trade of certain Latin American countries during the years 1938 to 1941.*

| COUNTRIES | Monetary units | Years | Import | Export | Balance of trade |
|---|---|---|---|---|---|
| *Argentina* | Paper pesos | 1938 | 1,460.9 | (1)1,400.4 | — 60.5 |
| | | 1939 | 1,378.0 | 1,770.0 | + 392.0 |
| | | 1940 | 1,498.8 | 1,629.6 | + 130.8 |
| | | 1941 January-June | 506.4 | 817.2 | + 310.8 |
| *Brazil* (2) | Milreis | 1938 | 5,197.0 | 6,097.0 | + 900.0 |
| | | 1939 | 4,983.6 | 5,616.0 | + 632.9 |
| | | 1940 | 4,964.4 | 4,966.8 | + 2.4 |
| | | 1941 January-June | 2,364.0 | 3,086.0 | + 722.0 |
| *Chile* | Gold pesos | 1938 | 501.76 | 674.09 | + 172.33 |
| | | 1939 | 410.52 | 665.52 | + 255.00 |
| | | 1940 | 506.04 | 679.56 | + 173.52 |
| | | 1941 January-June | 228.53 | 343.46 | + 114.93 |
| *Colombia* | Pesos | 1938 | 159.26 | 144.45 | — 14.81 |
| | | 1939 | 183.48 | 177.00 | — 6.48 |
| | | 1940 | 148.20 | 166.44 | + 18.24 |
| | | 1941 January-March | 32.15 | 39.52 | + 7.37 |
| *Mexico* (2) | Pesos | 1938 | 494.03 | 817.27 | + 323.24 |
| | | 1939 | 629.76 | 914.40 | + 284.64 |
| | | 1940 | 669.60 | 960.00 | + 290.40 |
| | | 1941 January-April | 237.99 | 222.05 | — 15.94 |
| *Paraguay* | Gold pesos | 1938 | 13.08 | 12.02 | — 1.06 |
| | | 1939 | 12.69 | 16.02 | + 3.33 |
| | | 1940 | 14.88 | 11.02 | — 3.86 |
| | | 1941 January-March | 2.47 | 2.55 | + 0.08 |
| *Peru* | Sol | 1938 | 260.16 | 342.13 | + 18.97 |
| | | 1939 | 261.84 | 381.48 | + 119.64 |
| | | 1940 | 318.72 | 405.84 | + 87.12 |
| | | 1941 January-June | 153.78 | 270.18 | + 116.40 |
| *Uruguay* | Pesos | 1938 | 74.39 | 96.35 | + 21.96 |
| | | 1939 | 65.40 | 101.40 | + 36.00 |
| | | 1940 | 74.28 | 110.52 | + 36.24 |
| | | 1941 January-May | 19.86 | 55.20 | + 35.34 |

(1) Exports for Argentina are here valued at the same rate of exchange as imports, and not at the artificial preference rate used for exporters and constituting an export bonus.

(2) General trade.

*Exports of certain agricultural products from the principal exporting countries of Latin America*

| | 1939 | 1940 Seven months January July | 1940 Five months August December | 1941 7 months (January-July) |
|---|---|---|---|---|
| | | In thousands of metric tons | | |
| ***Argentina*** | | | | |
| Wheat | 4 745 9 | 2 648 1 | 992 0 | 1 555 2 |
| Wheat flour | 98 7 | 46 2 | 24 5 | 21 8 |
| Maize | 3 196 0 | 1 158 4 | 416 3 | 275 0 |
| Linseed | 1 183 1 | 622 4 | 129 8 | 286 0 |
| Wool greasy | 122 7 | 61 9 | 37 1 | 104 2 |
| Wool washed | 26 6 | 21 2 | 16 3 | 24 6 |
| Beef fresh | 353 5 | 284 2 | | |
| Beef chilled | 110 5 | 89 3 | | |
| Beef frozen | 6 4 | 1 8 | | |
| Beef canned | 82 5 | 79 9 | | – |
| Mutton frozen | 54 8 | 61 8 | | |
| ***Brazil*** | | | | |
| Coffee | 950 9 | 430 0 | 295 9 | 435 2 |
| Cotton | 323 5 | 224 3 | | — |
| Beef chilled and frozen | 43 5 | 98 9 | | – |
| Beef canned | 34 4 | 46 1 | | |
| Cotton seed | 55 2 | 19 2 | | — |
| Babassu nuts | 40 2 | 40 8 | | – |
| ***Chile*** | | | | |
| Beef fresh chilled and frozen | 10 6 | 12 3 | | |
| Wool greasy | 11 6 | 11 0 | | – |
| ***Colombia*** | | | | |
| Coffee | 222 1 | 260 6 | | — |
| ***Equador*** | | | | |
| Cacao | 15 3 | 11 2 | | — |
| ***Paraguay*** | | | | |
| Beef canned | 12 1 | 9 1 | | — |
| Cotton | 6 0 | 4 1 | | – |
| ***Peru*** | | | | |
| Cotton | 77 2 | 51 3 | | |
| ***Uruguay*** | | | | |
| Beef and mutton | 66 0 | 61 8 | | 21 0 (5 months) |
| Linseed | 109 2 | 100 8 | | 37 3 (4 months) |
| ***Venezuela*** | | | | |
| Coffee | 27 4 | 28 7 | | |
| Cacao | 15 4 | 15 3 | | |

particularly pronounced in the case of agricultural products, in the disappearance of certain sources of imports, often involving a decided shift in the terms of trade against the importing countries, and in the various adverse effects of these developments upon the public finance and the monetary systems of the Latin-American Republics.

### FOREIGN TRADE.

The evolution of the foreign trade of the Latin American republics from 1938 to the summer of 1941 is shown in the table on page 360.

Covering, as it does, all the foreign trade of the countries concerned, this table does not always give a sufficiently clear picture of the changes due to the war, as compensating influences come into play, such as the movement of prices of some particular commodities, especially those needed for armaments, and the considerable increase during 1940 and 1941 in the trade with the United States, which went far to make good, at least for the time being, the loss on the trade with Europe.

The increase in the turnover of trade with the United States, however, during the earlier part of 1940, was somewhat unilateral in that it involved, in the first instance, larger imports to the Latin-American countries of goods from the United States, which took the place of those formerly imported from Europe, but cost, as a rule, more, thus considerably swelling the aggregate value of imports, even if their volume was not always increased. These imports, being largely financed by the credits granted by the United States direct or through the Export-Import Bank, have not had a counterpart in exports. Only during the later part of 1940 a considerable impulse was given to exports from Latin America, as a result of the intensification of the armaments policy of the United States, of the purchase of various products for war stores and for supplies to Great Britain, and of various measures intended to encourage intra-American trade, such as the Coffee Agreement of November 1940, etc.

With regard to purely agricultural exports, which constituted the principal articles of trade with the Old World, and were particularly difficult to absorb within the two American continents, the situation was much clearer, the diminution being very pronounced, as shown in the table on page 361.

Of all the countries of Latin America, Argentina's case was probably the most difficult. Not only did the countries of Continental Europe normally take roughly one third of her total exports, and furnish over 25 per cent. of her imports, but a large margin in her favour on the trade balance was particularly important to Argentina owing to the heavy foreign liabilities arising out of the large amounts of foreign capital invested in the various branches of her public services and economic activities. The marked decline in the spot prices of some of her principal agricultural products may be seen from the table on page 363.

This table gives a fairly good idea of the general trend of the prices of the principal agricultural export commodities not only in Argentina, but in the other countries of Latin America as well, unless modified by such special causes as short or particularly abundant crops in certain localities, etc.

*Movement of prices of certain agricultural products at Buenos Aires*

| | Average for | | | 1940 prices at the end of each quarter | | | | 1941 prices at the end of each quarter | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1937 | 1938 | 1939 | I | II | III | IV | I | II | III |
| | Paper pesos per 100 kg | | | | | | | | | |
| Wheat | 13.47 | 9.00 | 6.04 | 7.50 | [illegible] | 6.4[illegible] | 6.81 | 6.80 | 6.85 | 6.77 |
| Maize | 6.83 | 7.75 | 6.60 | 4.58 | 4.7[illegible] | [illegible] [1] | 2.11 | | | |
| Linseed | 15.33 | 14.30 | 15.11 | 17.07 | 15.25 | [illegible] | 9.40 | [illegible] | 9.03 | |
| Beef | | | | 28.40 | 28.01 | 24.50 | 25.10 | [illegible] | 30.00 | |
| Hides | | | | [illegible] | 8.50 | 8.11 | 8.15 | 8.10 | 9.63 | |

([1]) End of November 1940

At the outbreak of the war here as well as in the United States there have been optimistic expectations at work which produced a certain strengthening of the price situation. The expectations based upon the proposition that the war, in the main, will follow the same course as did that of 1914-18 thus affording the overseas countries the chance of increased exports and soaring prices, did not, however, materialize, first owing to the blockade and counter-blockade, as well as to the shortage of tonnage greatly accentuated by the withdrawal of United States shipping from most European sea routes and the consequent great rise in freight and insurance charges and later owing to the development of military operations, which, in the course of the summer of 1940, shut Europe off almost completely. To quote a few examples the disappearance from the market in the spring of 1940, of Belgium and the Netherlands has been estimated to involve for Argentina the loss of about 15 per cent or 220 million pesos worth of her exports. This was particularly grave as they took large quantities of maize, while at the same time supplying shipping facilities and leaving large balances of free exchange available for disposal. With regard to Brazil it has been estimated that the reduction in her exports of coffee caused by the military developments in Europe in the spring and summer of 1940 amounted to over one third of her total exports of this product.

Thus, the year 1940 passed generally under the sign of declining exports and falling prices, the more so that, in the course of that period, the United States have mostly helped the Latin-American countries by the grant of credits intended for the financing of the imports of industrial products from the United States in substitution of those formerly obtained from Europe, and partly to enable them to hold in stock their exportable surpluses which could not be marketed.

Indeed, during the year 1940, Latin America imported from the United States 726.8 million dollars worth of goods, compared with 568.8 millions in 1939 and 494.8 millions in 1938, while its exports to the United States amounted to 620.1 million dollars in 1940, as against 518.0 millions in 1939 and 453.5

millions in 1938. Thus, the adverse balance against Latin America in her trade with the United States in 1940 reached 106.7 million dollars, as against 50.8 millions in 1939 and 41.3 millions in 1938.

If we consider that, before 1940, the adverse balance of trade with the United States was set off by credit balances on the trade with other countries, of which many have disappeared from the market in 1940, the serious nature of the situation appears with great clearness. The situation began to improve in the later part of the year, owing partly to the extension and acceleration of the defence programme in the United States and the expansion of assistance to Great Britain, which involved an increase in the demand for certain Latin American exports, partly to special measures, such as the conclusion of the Coffee Agreement in November 1940 etc. These factors accounted for a certain revival of Latin-American exports at the end of 1940 and during the early part of 1941, and an improvement in prices. Among the agricultural products affected by this improvement were wool, mostly furnished by Argentina and Uruguay, which accounted for about 90 per cent. of the total, the balance coming from Chile, Peru and Brazil. Hides and skins, mostly from Argentina and Brazil, also increased considerably. Coffee exports to the United States, on the other hand, have declined, but this decline, particularly marked in the case of Brazil, was largely compensated by a stabilization of prices, particularly important as the loss of the European markets for this product, practically complete since the summer of 1940, was a very heavy blow to the producing countries.

This improvement in 1941, which was marked in certain agricultural products more immediately needed in connection with the defence programme, as well as in certain non-agricultural products, such as copper, petroleum etc., did not, however, so far extend to the principal cereals, which were particularly difficult to place.

The changes in the value of some of the principal United States' imports from Latin America may be seen from the following table:

*Value of the principal commodities imported by the United States from the Latin-American Republics.*

| | 1938 | 1939 | 1940 | Per cent. increase or decrease in 1940 over 1939 | |
|---|---|---|---|---|---|
| | Millions of dollars | | | | |
| Coffee | 133.8 | 136.2 | 124.3 | | 8.7 |
| Cane sugar | 79.7 | 75.0 | 69.4 | — | 7.0 |
| Copper | 26.6 | 30.1 | 51.9 | + | 72.4 |
| Crude petroleum and semifinished oils | 18.9 | 23.3 | 47.6 | + | 104.3 |
| Raw wool | 7.8 | 17.1 | 46.7 | + | 173.1 |
| Hides and skins | 9.8 | 19.0 | 24.4 | + | 28.4 |
| Cacao | 12.1 | 13.2 | 13.1 | — | 0.3 |
| Sodium nitrate | 10.7 | 11.2 | 12.5 | + | 11.6 |
| All other products | 148.0 | 170.7 | 202.8 | + | 18.8 |

The above table, giving as it does only the value of the various imports, may cause the reader to doubt as to the extent to which the large increases in the value of imports of certain primary products may be attributed to a rise in their prices. To dispose of this doubt, it will do to point out that the non-agricultural primary products specified in the table - copper, crude petrol and nitrate of soda – in spite of war-time demand, have not registered any marked advance in prices on the United States' market. Indeed, copper actually fell from 13 cents per lb in October 1939 to 12 cents in October 1940, and remained at the same figure in October 1941, its prices in the intervals having remained almost unchanged. Crude petrol rose from 82.5 cents per barrel in October 1939 to 102 cents in October 1940 and 117 cents in October 1941, the rise during the first year of the war amounting only to 19 per cent., while the increase in the value of imports was over 104 per cent. Nitrate of soda, from 1.45 dollars per 100 lb in January 1940 rose to 1.47 dollars in January 1941, and did not advance again until September of that year, when it reached 1.50 dollars. Under such conditions, it would appear clear that not only the value, but the quantum of trade in the commodities needed for warfare had increased, and that the figures in the above table show clearly the part played by the defence programme of the United States in the recent development of Latin-American trade with that country.

We see that the increase took place, in the first instance, in non-agricultural commodities, with the exception of wool and hides and skins, of which great quantities are needed for military clothing and equipment. Accordingly, the countries which profited most by these developments so far were those, as a rule, whose exports consist to a large extent of minerals or of other products needed for military purposes. These products have appreciated relatively to agricultural commodities, though, it should be noted here, their appreciation was due not so much to the rise in their own prices as to the fall in those of agricultural products.

Latin-American imports have also in most cases appreciated relatively to its exports, as the former consist mainly of means of production and of various consumers' goods of industrial origin, whose prices have increased as a result of the general rise in the cost of labour and of raw materials, in freights and in overhead charges due to the war, as well as of the necessity to import from countries in which the price level is higher.

## Prices and cost of living.

The adverse turn in the terms of trade, which, in the case of most Latin-American exports, has been a notable feature of the sitution during the first two years of the war, combined with the increase of the expenses on armament, which Latin America had to bear along with the rest of the world, resulted in a certain upward tendency in the general price level and in the cost of living, with all the usual consequences of these phenomena for the economy of the countries concerned.

The following index numbers of wholesale prices for some Latin-American countries illustrate the situation

*Index numbers of wholesale prices in some Latin-American countries according to groups of commodities*

(1937 = 100)

| | Average 1938 | Average 1939 | Average per quarter of 1940: I qu. | II qu. | III qu. | IV qu. |
|---|---|---|---|---|---|---|
| *Argentina* | | | | | | |
| General | [illegible] | [illegible] | 110 | [illegible] | [illegible] | [illegible] ( months) |
| Agricultural | [illegible] | [illegible] | 85 | 81 | [illegible] | |
| Non-agricultural | [illegible] | [illegible] | 117 | 118 | 119 | |
| *Chile* | | | | | | |
| General | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | |
| Domestic agricultural | 94 | [illegible] | [illegible] | 100 | 105 ( months) | |
| Domestic industrial | [illegible] | [illegible] | [illegible] | [illegible] | 100 ( months) | |
| Total domestic | 94 | [illegible] | [illegible] | [illegible] | [illegible] ( months) | |
| Imported | 98 | 101 | 110 | 109 | 110 ( months) | |
| *Costa Rica* (San José) | | | | | | |
| General | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | |
| Agricultural | [illegible] | [illegible] | 84 | 78 | [illegible] | |
| Industrial | [illegible] | 10[illegible] | 106 | 103 | 10[illegible] | |
| Imported goods | 96 | 94 | [illegible] | 101 | 101 | |
| Exported goods | 87 | [illegible] | 76 | [illegible] | [illegible] | |
| *Peru* | | | | | | |
| General | 100 | [illegible] | 116 | 118 | [illegible] | [illegible] |
| Food | 10[illegible] | 101 | 104 | [illegible] | 111 | |
| Domestic products | 102 | 101 | 103 | [illegible] | 108 | |
| Imported products | 10[illegible] | 11[illegible] | 132 | 137 | 143 | |
| Exported products | [illegible] | 94 | 104 | 100 | 10[illegible] | |

The implications of the above figures are clear. The war put Latin America before a situation in which it had to meet progressively growing liabilities out of dwindling assets.

While the index numbers of wholesale prices quoted above serve to show the general effects of the war-time developments upon the price system and through it, upon the economic and monetary situation in the countries concerned, the index numbers of the cost of living also illustrate the social aspect of the situation. Here also, in spite of the considerable decline in the wholesale prices of the principal foodstuffs in Latin America, there has been a more or less marked advance in most cases.

*Index numbers of the cost of living in certain countries of Latin-America*

(1929 = 100)

| | Average 1939 | Average 1940 | Average Jan.-June 1941 |
|---|---|---|---|
| *Argentina* (Buenos Aires) | | | |
| all groups (¹) | 93 | 96 | 95 |
| food alone | 92 | 93 | 91 |
| *Bolivia* (La Paz) | | | |
| all groups | | 700 | 931 |
| *Chile* (Santiago) | | | |
| all groups | 171 | 193 | (5 months) 207 |
| food alone | 177 | 206 | (5 months) 215 |
| *Colombia* (Bogota) | | | |
| all groups | 118 | 115 | 114 |
| food alone | 120 | 114 | 111 |
| *Costa Rica* (San José) | | | |
| all groups | 108 | 105 | 106 |
| food alone | 103 | 97 | 97 |
| *Mexico* (Mexico City) | | | |
| food, heating and lighting, clothing and rent | 155 | 157 | 159 |
| food alone | 156 | 154 | 154 |
| *Peru* (Lima) | | | |
| all groups | 96 | 104 | [illegible] |
| food alone | 103 | 109 | 120 |
| *Uruguay* (Montevideo) | | | |
| all groups | 105 | 108 | 108 |
| food alone | 97 | 102 | 103 |
| *Venezuela* (Caracas) | | | |
| food alone | 101 | 97 | |

(¹) *All groups* comprise food, heating and lighting, clothing, housing and other expenses.

We see that the rise in the cost of living was almost general, and that it was accounted for mainly by other items than food, indeed, in those cases in which the general index of the cost of living had not increased, or even had fallen this was due mostly to a heavy reduction in the prices of food. Peru was an outstanding exception, for there the food index showed a considerable rise, which was probably due to the special situation of that country whose economic prosperity is essentially based upon its great mineral wealth, of which the exploitation has been greatly encouraged by the needs of armaments.

**Latin America facing its problems.**

From what has been said in the preceding pages, it would appear that Latin America is, indeed, faced with difficult problems, but that these problems, rather then being new, are the old ones inherent in her very economic structure and due to historical causes. The present war has had the effect of greatly aggravating the difficulties of a continent whose whole economic progress has been fostered by the continuous expansion of world-wide division of labour, which involved far-reaching specialization on the part of particular countries bound together by the universal nexus of the world market.

What happened now as a result of a mechanical closing of certain sections of that market by war and blockade, had happened before, as was the case during the great depression of 1929-32, as a result of a dislocation in the inner working of the system of world economy. The manifestation of the disturbance could be more or less acute and difficult to deal with, but the fundamental cause of weakness which made Latin America particularly subject to it, was always the same, namely, the lack of balance in its economic structure, which made it wholly dependent for its living and solvency upon the changing whims of the world market, over which it had no control.

It may, indeed, be said that essentially the same was the situation of the other countries of the New World, such as Canada, Australia or New Zealand, but in the case of these the lack of balance in their own economic structure was to a certain extent mitigated by the fact of their belonging politically to a great and highly developed system, which, should the worst come to the worst, would be ready and able to help them, as was actually the case, during the great depression of 1929-32, with the agreements concluded at the Ottawa Imperial Conference in 1932.

In the Old World, the countries which find themselves in a similar situation, usually find the solution of their problems in being drawn within the orbit of économic and, eventually, of political, interests of some leading industrial country.

The geographical and political isolation of Latin America, combined with the fact that its economy cannot be considered as naturally complementary to that of its only great industrial neighbour--the United States—render its position in this respect particularly difficult. As a competitor of other primary producers in the Old and the New World, Latin America naturally feels the repercussions of any national, regional or imperial arrangements leading to the solution of the economic problems of these countries, such as trade restrictions or regulations, imperial preferences, agreements for economic cooperation between industrial and agricultural countries, etc., while its own efforts in the same direction are necessarily confined within relatively narrow limits, as they cannot be allowed to trespass upon the reserved grounds of intra-imperial or other political relations of others.

Under such conditions, already prior to the present war, especially during the years following the crisis of 1929, Latin America has been seeking a solution for its basic economic problems; and the aggravation of the situation caused by the war and the blockade did not so much create new problems and evolve new

policies, as give a fresh impetus to the efforts already made and, in some cases, provide conditions which, at least at the time being, contributed to their success.

These efforts bore partly upon the achievement of certain immediate objects, partly upon more far-reaching programmes, involving a more or less radical transformation of the economic structure of the Latin-American countries.

### New outlets

The immediate object of the economic policy of the Latin American Republics was that of opening up new outlets which would make up for the loss of the European markets, and of ensuring the necessary imports on the best possible terms, so as to enable them to maintain their financial solvency. Provisionally, until new outlets were opened, imports had naturally to be restricted in order to keep the balance of trade on the right side

Here, the principal change was the great extension of trade with the United States, to which we have already had occasion to refer. This development dated from before the war, when, in the course of the keen struggle which had been going on for the Latin-American markets, the United States began an active trade campaign there, assisted by large credits and involving, at least in one case, namely that of the trade agreement with Brazil, signed in April 1939, a plan of far-reaching economic co-operation between the two countries Credits were granted by the United States through the Export-Import Bank, which, i. a., lent 10 million dollars, under guarantee of the Federal Government, to a cooperation for the extension of trade with Latin America. At that time, before the outbreak of the war, these efforts were mostly intended to secure the competitive position of the United States products in Latin America against European competition; but when the war came, and the European connections of Latin America were violently cut off, the situation changed, because, failing the earnings in Europe, it was no more possible for Latin America to continue as an importer of United States or other countries' products on the former scale, and import credits could not provide a solution of the problem. The United States had now to assure the Latin-American countries a market for their exports. This, as we have seen, was the difficulty which had to be faced in 1940, when the balance of Latin-American trade with the United States turned heavily against the former.

This problem, which has always been present in the minds of both the United States and the Latin-American countries, was an exceedingly difficult one, seeing that most of the staple exports of Latin America are not complementary but competitive to the production of the United States. This is why, even before the present war, efforts had tentatively been made so to modify the agricultural production of Latin America as to make it better adapted to the demands of the United States. These efforts found their clearest expression in the trade agreement between the United States and Brazil, which provided for a cooperation between the parties concerned in developing in Brazil the production of commodities needed by the United States.

The most important step in the direction of such development is that of the revival and extension in the tropical regions of South and Central America of the cultivation of hevea for the production of rubber. In June 1940 the U. S. Congress passed a bill which assigned 500,000 dollars "to enable the Secretary of Agriculture to conduct investigations directed towards the development of rubber production in the Western Hemisphere", and a programme of such investigation was immediately put into effect by the joint efforts of the United States and of the Latin American countries interested in the scheme. By the spring of 1941 the work of survey and experimental planting was already well advanced in Mexico, Guatemala, Honduras, Nicaragua, Costa Rica, Panama, Colombia, Venezuela, Ecuador, Peru, Bolivia, Brazil and Haiti. This, probably, constitutes the most hopeful of the various efforts, and one which, considering the enormous consumption of rubber by the United States, is bound to be of permanent importance.

Other efforts consist in the development of the production of fats and oils, of which the United States' consumption is continuously on the increase. The conclusion in November 1940 of an international coffee agreement establishing fixed quotas for coffee exports to the United States by the exporting countries of Latin America, was another step in the direction of helping the ordered marketing of Latin-American staples. A scheme was also taken into consideration for the application of an analogous system of agreed quotas to the exports of cacao.

All these measures, however, left practically out the great agricultural staples of the temperate zone, wheat and maize, as well as animal products Here, however, the war, while it destroyed certain possibilities of disposal, helped the situation to some extent by creating conditions in which, at least for the time being, the solution of the problem was facilitated. Indeed, when, in the autumn of 1940, the United States intensified the work upon their own defence programme and considerably increased their shipments of military equipment and supplies to Great Britain, the demand for Latin American products, even such as could not normally find a market either in the United States or in the contries of the British Empire, was considerably increased. Not only minerals and commodities such as hides or wool, directly used for military purposes, but other agricultural products as well, which could not be disposed of in 1940, were in demand in 1941. Thus, during the first 6 months of 1941 the United States, in collaboration with the British Empire, has absorbed such an increasing amount of Argentine produce, as to make it possible, before the end of 1941, to absorb some at least of its important surpluses.

In the spring of 1941 a special "corporation for the encouragement of trade" has been established jointly by Argentina and the United States at Buenos Aires with a capital of 1,000,000 pesos, with the object of promoting the exchange between the two countries of those products the trade in which between them was not yet sufficiently developed. This is particularly interesting because it involves an expansion of United States trade in a country with which, before, owing to the nature of their respective production, the exchanges were exceedingly limited. In the autumn of 1940 the United Kingdom, for its part, also made arrange-

ments for the supply of large quantities of Argentine foodstuffs payable by the transfer of British-owned Argentine stock.

During the first 4 months of 1941 Brazil's favourable trade balance reached 23,752,571 dollars, compared with the former deficit for the same period in 1940 of 3,164,710 dollars. The United States have, indeed, arranged with Brazil for the wholesale purchase during the next two years of the surplus of certain commodities formerly shipped to European and Asiatic markets.

Uruguay, which had been particularly badly hit by the closing of European outlets, has also been enabled to expand her exports to the United States to such an extent that in 1941 it is expected to have an export surplus on its trade with that country of over 75,000,000 pesos.

The great increase in the demand for various primary products caused by the war in the British Empire and by the carrying-out of the defence programme in the United States enabled them to absorb a large proportion of the available stocks and of the current production of Latin America in 1941, a thing which, under normal peace-time conditions, would hardly be possible. Not only Brazilian manganese, Peruvian tungsten or copper, oil, etc., and other mineral products of Latin-American countries, but foodstuffs as well were now needed for the armed forces, and had to be obtained, even at a sacrifice, so that in 1941 Latin-American commerce would appear to have entered into a phase of relative war-time prosperity, which, however, is wholly conditioned by the present emergency and cannot be expected to outlive its duration.

### TRANSPORT.

At the time being, an important limiting factor in the development of Latin-American exports consists in the shortage of tonnage, especially aggravated since the withdrawal, in July 1941, of Japanese ships from American routes, which reduced the available tonnage by about 33 per cent. At the present time both the United States and some at least of the Latin-American countries, which are rapidly developing their merchant shipbuilding, are doing their best to deal with the situation, by providing new shipping space. As a provisional measure, a considerable number of ships under various belligerent flags, immobilized in American ports, have been sequestrated or bought by the Governments of the countries concerned to be put into service.

In connection with intra-American transport, we should mention here the project, launched in 1924, of the Pan-American Highway which, passing from Texas in the United States to Santiago in Chile, should link up the Northern and the Southern continents by a great motor route. This highway, with its various ramifications already existing within the different countries of Latin America, should constitute a great network of roads for intra-American traffic. At the present, the section which has to be added is the Northern, from Texas to Panama, and for its completion large sums have been lent by the United States Government direct and through the Export-Import Bank. In the general scheme of pan-American economic co-operation, this should be considered as constituting an important element.

An important development in pan-American transport during these last few years was the great expansion of aerial communications, all the more important because of the difficulties presented by the extensive forests and swamps which make large tracts of the territory of South America almost impracticable for overland traffic.

### INDUSTRIALIZATION.

All these developments, which are undoubtedly very important for the solution of the current problems of Latin America, and whose solution may at the present time be encouraged and facilitated by the conditions due to the war, have, however, the obvious drawback that they do not create that minimum of economic stability of which these countries have long been feeling the need. For years past, and especially since the great depression of 1929-32, the Latin-American republics have been feeling their way towards the creation, within their own borders and beyond them, within the Latin-American continent, by the organized cooperation of the countries concerned, of a more balanced economic system, less vitally dependent upon the uncontrollable whims of the world market.

With its great natural wealth, Latin America certainly offers great possibilities of industrial development, and its industrialization, combined with a well thought-out scheme of economic cooperation between those of its constituent countries whose economics are more or less complementary to each other, should indeed probably be the best solution of their fundamental economic problems.

It is, therefore, natural that, while seeking to get out of their immediately pressing difficulties by various arrangements with the United States and with other industrial countries, the Latin-American Republics have been looking further afield and have been making more far-reaching plans which could, if successful, ensure them greater economic independence and stability. Their efforts in this direction assumed the form of two distinct but essentially interdependent movements, namely that of industrialization, on the one hand, and that of Latin-American economic cooperation, on the other hand. This development of Latin-American cooperation occupies a somewhat peculiar position with regard to the wider Panamerican movement, in so far as, while often parallel, the two trends do not always merge.

As in many other mainly agricultural countries, the industrialization in the Latin-American Republics received a considerable impetus in the years following the depression of 1929-32, and has later been stimulated by rearmament. In spite of the progress achieved in the course of this period, especially in Brazil, Chile, Peru and Mexico, it was still confined within very modest limits and could be said to be at its very beginnings.. The most notable branches, apart from such primary industries as mining and petroleum, are metallurgy and the textiles, in which some progress has been made, so that the products of these branches are not only consumed within the producing countries, but even form an article of commerce between the different Latin-American Republics.

The development of industry has been helped by protective duties, and during recent years much of the Latin-American imports consisted of various industrial equipment.

Yet, the industrialization of Latin-America, in spite of the presence of a considerable variety of natural resources, has to contend with difficulties which cannot easily be eliminated. First among them is the small capacity of the domestic markets for manufactured goods, due to the sparsity of population and the low purchasing power of the great rural masses. The sparsity of population, its mainly agricultural character and its primitive mode of living are also responsible for the shortage of local skilled labour, which makes it necessary for the industries to be manned largely by immigrant hands.

For the problem of population in Latin America, as in practically all the new overseas countries, there exists no other solution than that which, in the past, had been instrumental in assuring the industrial growth of the United States, namely free immigration on a large scale. In this respect, the developments of the last few years, during which the industrialization of Latin America has been deliberately fostered, were far from favourable to its progress, as since the depression of 1929-32 and during the later years, the immigration policies of the Latin-American Republics, partly for social and partly for political reasons, were rather restrictive. The war, by still further reducing international movements of population, made the situation in this respect even worse It also brought about in some cases the discontinuance of the importation from Europe of industrial equipment and other means of production. Even if and when, as was often the case, the United States stepped into the breech and was ready to supply industrial equipment and other producers' goods on credit, there still mostly remained the difference in price, American products being generally more costly. Moreover, there were the financial consequences of war-time conditions to be taken into account, which consisted in the necessity of generally reducing imports in order to prevent an unfavourable turn in the trade balance, in the rise in the costs of living and of labour and in increased taxation, which did not favour industrialization. During the years 1939-40 and 1940-41 all these influences came into play, and while the need for industrialization, as a means of achieving a better balance in the economic structure of Latin America, was probably more than ever urgent, the obstacles with which it had to contend have also increased.

On the other hand, the turn taken by the evolution of Latin-American economic relations with the United States during the present war would appear to be favourable to the industrial and general economic development of the former with the active cooperation of American capital. Indeed, the United States, even if they may, for a time, increase their imports from Latin America to such an extent as to leave a margin on the trade balance in favour of the latter, in the long run will be bound increasingly to consolidate their position as a creditor country on both the financial and the trade account. Under such conditions, to enable Latin America to acquit itself gradually of its growing liabilities on the balance of payments, the United States will have no other means but re-investing there a continually increasing part of the balances accumulating to their credit in the Latin-American countries, thus supplying the capital needed for their industrialization.

### ECONOMIC COOPERATION BETWEEN THE LATIN AMERICAN REPUBLICS.

The problem of industrialization, as well as many other vital problems of Latin America, is closely bound with that of developing more intimate economic relations between the South-American countries.

Obviously, when one of the fundamental questions for those countries which are in a position to develop industrial production, is that of ensuring a sufficiently wide market for its products, and the capacity of their home markets is not sufficient to absorb them, the possibility of industrialization depends upon the outlets provided by the neighbours; and thus here, as well as in the case of many agricultural products, there is the question of closer economic cooperation within the continent, ensuring a better intra-Latin-American division of labour.

Thus, for some time, and particularly during the last few years, along with the intensification of pan-American activity involving the cooperation of Latin-American primary producers with the United States as a great industrial country, there has been developing a movement towards intra-Latin-American cooperation, aimed at achieving a higher degree of independence and economic stability to the Latin-American continent as a whole. Without being antagonistic, the two movements were distinct, even if in many cases they ran parallel and pursued the same immediate objects.

The intensification of the pan-American movement dates from the Havana Conference of 1928, which was the first to bring forward the question of agricultural cooperation on a pan-American scale. The intra-Latin-American movement began to gain ground especially after the depression of 1929-32, but it took more definite shape, in the form of conferences and agreements between groups of Latin-American countries, only in the course of the last two years, since the beginning of the war in Europe which accentuated the difficulties of their position.

The Interamerican Conference in Panama, which met in the autumn of 1939, shortly after the outbreak of the European war, and which officially proclaimed the neutrality of the American Republics in the present conflict, has also envisaged the effects of the war upon American economy and the need of cooperation between the American countries for dealing with the situation. This conference, followed by that of Havana in the autumn of 1940, gave a strong impetus both to the development of economic cooperation between the United States and the Latin-American Republics, and to that of closer collaboration between the latter. It inaugurated a series of bilateral and multilateral negotiations particularly between those countries of the South-American continent which had important common interests arising out of their geographical position, or out of the more or less complementary nature of their economics.

Thus, at the end of January 1941, the representatives of the so-called La Plata countries—Argentina, Bolivia, Brazil, Paraguay and Uruguay— met at Montevideo, with observers from the United States, Chile and Peru present at the conference. The programme of the conference consisted in the discussion of a wide range of problems bearing on the economic cooperation between the

countries concerned. It included the problem of the application of the most favoured nation clause in their mutual economic relations; the regulation of shipping on the La Plata; the development of trade between the La Plata countries under its various aspects; the constitution of free ports in the maritime countries for the use of the inland States, Bolivia and Paraguay; a customs union; the cooperation in the development of communications in connection with the great Pan-American Highway; the establishment of arbitral courts for trade disputes, the control of smuggling, joint measures for the control of cattle and plant diseases; finally, closer cooperation in monetary and financial matters.

It would naturally have been too much to expect so ambitious a programme, bristling with difficult problems, to be put into execution by a conference within a few days. Indeed, the conference's principal achievement was to have formulated and put definitely for discussion and eventual solution a number of fundamental questions, clearing up the attitude of the different countries towards the various solutions proposed. The most important practical result was probably the acceptance on the part of Argentina, Brazil, and Uruguay of a draft convention by which these countries waived their rights under the most favoured nation clause to the extension to them of any concessions to be granted by one of them to Bolivia and Paraguay a concession involving the recognition by the countries concerned of their character as a regional economic bloc presenting a common front to the outside world.

The La Plata Conference should be considered as the first of a series of conferences to be arranged between the various groups of Central-and South American Republics. At the time of the first meeting at Montevideo, Brazil was already envisaging similar consultations between the Amazon countries, while Chile had the intention to take the initiative of a conference of the countries of the Pacific Coast; projects for a conference of the countries of the Caribean coasts were also under discussion.

Along with these multilateral negotiations, we should note the various bilateral arrangements attempted or actually made between the countries of Latin America with a view to develop their mutual economic relations and of helping each other in the disposal of their products. Of these, as an example, we shall mention here the negotiations between Argentina and Brazil.

In the autum of 1940 the Ministers of Finance of these two countries signed a declaration laying down the fundamental principles of economic cooperation between them, which would facilitate the solution of the problems arising out of the war and promote their economic development. The absorption of at least part of the available surplus of products was to be assured by the exchange of these surpluses between the two countries, each country having agreed to take up 50 million Argentine pesos worth of those products of the other which do not compete with its own. These products were to be used for the constitution of emergency reserves, their re-export not being permitted. The purchases were to be financed by the respective governments. The commodities to be so exchanged were not specified in the agreement. Both countries have also pledged themselves to help the extension of the consumption of each other's products, and for

this purpose agreed, within a maximum term of 3 years, to prohibit the sale of wheat, coffee and mate adulterated by substitutes. This applied particularly to the admixture of other grain to the wheat used for bread-making in Brazil. With regard to the development of industries, it was agreed that the two countries, in carrying out their plans of industrial expansion, will co-ordinate their efforts in such a way as to prevent overlapping and to supplement each other's production. The trade in the products of the new industries would be free of duties or other restrictions for a term of 10 years. This would apply to goods produced only in one of the two countries, while in the case of those produced in both the countries concerned, the duties were to be gradually reduced. It was expected in this way to increase the Brazilian exports of cotton goods, iron, steel, coal and some other products, and the Argentine exports of boots and shoes and of leather and woollen goods. The trade was to be facilitated by special payment arrangements.

The practical carrying-out of these schemes was bound to take time, and in fact it was only in April 1941 that an agreement was reached concerning the repeal of the compulsory admixture of other grain to wheat in Brazil and the increase of the import of Brazilian textiles to Argentina. For the rest, no practical measures have yet been taken to put the programme of cooperation into effect.

### Summary.

Summing up what has just been said about the influence of the war upon the economic and agricultural situation in Latin America during the years 1939-40 and 1940-41, we can make the following observations.

(1) The European war, by closing some of the most important outlets for Latin-American trade and by depriving Latin America of certain essential imports, did not so much create new problems for solution as accentuate certain of the old problems rooted in the very structure of the economic system of this continent The same problems, in a more or less acute form, had presented themselves to Latin America in the past every time that the world market suffered from some serious dislocation, and that the working of the international division of labour was upset.

(2) In order to deal with the situation, Latin America had, in the first instance, to solve the immediately pressing problem of finding new outlets for her exports, on the one hand, and of substituting the imports she used to obtain from European countries, on the other hand. As to the outlets, after a period of difficulties in 1940, it became possible to find them in the United States, as well as in the United Kingdom and in the other parts of the British Empire, the demand of these countries for foodstuffs and other primary products having been greatly increased by the war. As to the substitution of the lost imports from Europe of various consumers' goods and means of production, which Latin America used to obtain under relatively favourable conditions, the problem was solved mainly by buying from the United States. This was done largely on credit, considerable sums having been allocated by the United States for

the financing of such purchases, but it involved an increase in the cost of imports to the importing countries, the prices in the United States being generally higher than those ruling in the European countries from which similar commodities used to be imported before the war.

(3) The developments which took place in 1940 and 1941 would appear, for the moment at least, to have facilitated the solution of the foreign trade problems with which Latin America was faced, so that her situation seems to have improved in 1941 under the influence of the special conditions created by the war It should, however, be borne in mind that this improvement was mostly due to such special circumstances and that it cannot be expected to continue beyond the limits of time during which the causes which had produced it continue to operate.

(4) Fully conscious of this aspect of the situation, the countries of Latin America, besides these immediate solutions, have also envisaged other measures, of a more lasting and radical nature, which would modify their economic structure in such a way as to render it more immune from outside influences and to ensure it greater stability. These measures consisted in the development of the industrial possibilities of the Latin-American continent which would eventually increase the purchasing capacity of the internal markets of the countries concerned and improve the balance of their economic structure, making it less dependent upon exports.

(5) These considerations have led to the development of a policy of industrialization, which has already been making progress for some years past, but to which the war gave a strong impetus lately. This policy is one of the outstanding characteristics of the present situation in Latin America.

(6) Closely bound to the policy of industrialization is another recent development in Latin America As the home markets of the several Latin-American countries have, as a rule, a relatively very small capacity of absorption for manufactured goods, there is a strong movement going on in favour of closer economic cooperation between them, which would enable them to extend the trade in their principal products, industrial as well as agricultural, to the whole continent. This movement towards closer economic cooperation between the Latin-American countries, as well as that of industrialization, has been greatly encouraged by the war.

## IV. The Eastern Hemisphere.

### Introductory remarks.

In dealing with the United States and Latin America we had to do with countries which, while occupying important positions in world trade, are not directly involved in the war. When now we pass to the Eastern Hemisphere, we are immediately confronted with a zone, in which most countries are either directly involved in the war, or are so strongly affected by military operations and by various political moves in connection with the war, that they cannot

be dealt with as really extraneous to the conflict. This means that, in dealing with them, we are faced with most of those difficulties which prevent the inclusion in our survey of the belligerent countries and confine the scope of our study to a mere outline of certain basic situations and trends.

Moreover, the zone we are about to deal with, apart from the influence of the European war, has for years been affected by a vast conflict of its own, whose repercussions are felt throughout the Far East and the Pacific Area: to wit, the Chino-Japanese war. Throughout the East, from India to the Australasian continent, and as far as the Pacific Coast of America, the repercussions of this long-drawn-out conflict combine with those, more recent, of the European war, into a complicated pattern of actions and reactions.

The area we shall consider here comprises the Far East, including Further India, the Near East and Africa. India, Oceania, South Africa and the U. S. S. R. will be left out, as belligerent countries. The U. S. S. R., though not engaged in the conflict, except at the very close of the period dealt with, has to be left out on account of the lack of information and of the closed character of her economy, which made it extremely insensitive to outside influences.

Considering the Eastern Hemisphere as a whole, we can observe that the economic situation of the non-European countries within it was affected in the first instance by two factors, which acted successively and in the opposite sense to each other. The first of these factors, which determined a certain revival of economic activity at the beginning of the European war, was the optimism born from the expectation that the economic repercussions of the present war will more or less reproduce the pattern of those which, during the war of 1914-18, created a boom in the neutral overseas countries. The fundamental condition of such a repetition was naturally the freedom of European maritime communications, which existed during the preceding world war, and particularly that of the Mediterranean routes. These optimistic expectations, however, were considerably damaged at the very beginning of the conflict by the very sharp application of the blockade and counter-blockade, as well as by the shortage of shipping space, which began early to be felt, owing largely to the withdrawal of American tonnage from many important zones along the coasts of Europe and the disappearance of German shipping from Ocean routes. But the decisive blow to these expectations was struck in June 1940 by the intervention of Italy in the war and the consequent closing of Suez and the Mediterranean sea. For all the countries of the Indian Ocean and of the Pacific, this involved the necessity of a thorough re-orientation of their trade, which had to look East to replace the outlets they have lost in the West. The radical change in the military situation in Europe in 1940 thus became the second decisive factor in determining the war-time economic situation of the countries of this area. While during the first phase, they looked forward to a wave of war-time prosperity coming from their usual markets in the West, during the second phase they had to seek alternative outlets in the East, their European markets having practically disappeared. Those countries which had succeeded in finding such a solution, escaped a crisis and, sometimes, even gained, at least for the time being; others found themselves in a precarious situation.

**The Far East and Further India.**

In the Far East our attention will naturally be centred upon the so-called ' yen bloc ' consisting of Japan, with its possessions Chosen and Taiwan, of Manchukuo and of the occupied provinces of China. China's other provinces, under the control of the Chinese Republican Government, are now practically cut off all maritime communications with the rest of the world, and the trade across its land frontiers is relatively so small, and so largely directed towards the U. S. S. R., which herself is almost entirely isolated from the world market, that the repercussions upon it of the European war and the blockade cannot be at all significant. It may be said to be almost exclusively affected by local factors, by the effects of world silver prices upon Chinese currency, and by the war in which China has been engaged now for over four years.

The ' yen bloc ', centring around Japan, is in a wholly different position. Japan, by dint of her economic structure, has always been vitally dependent on foreign trade, and has accordingly always been exceedingly sensitive to the developments taking place on the world market. Her policy in the Far East has been dictated by the desire to create a large economic space, with herself as the centre, which would enable her to obtain control of the primary products and of the outlets which she needed for her very existence and for which she has always had to struggle in cut throat competition on the world market. The constitution of the ' yen bloc ', following the creation of the Manchukuo and the occupation of the northern and maritime provinces of China, was a step towards the creation of this economic space, these countries, essentially agricultural and abundantly supplied with natural resources, being naturally complementary to the economy of Japan, mostly adapted to the development of manufactures and shipping.

During the decade immediately preceding the outbreak of the European war in 1939, Japan's trade with the countries of the " yen bloc" showed, indeed, a notable increase. The share of the bloc in the aggregate foreign trade of Japan, during the period from 1929 to 1938, increased from 26 to 35 per cent. for her exports and from 45 to 63 per cent for her imports. But, until the other countries of the bloc had achieved considerable progress in their own economic development, and until their latent possibilities have thus been more fully exploited, there remained the fact that, in spite of their potential wealth, they could not fully meet Japan's needs as sources of essential imports, while as markets for exports they created certain delicate problems which Japan had to face.

Though themselves large producers of rice and cotton—two agricultural products of which Japan was in need—all the countries of the " yen bloc" were normally dependent on imports to meet the needs of their own consumption of these commodities, so that Japan had to look outside the bloc for these essential supplies. The same was the case with such other necessaries as petroleum, coal, metals, rubber, etc., which had either wholly or for the greater part to be imported from outside the bloc area. These imports had to be paid by exports of Japanese products. The increasingly protectionist policy of most countries, with

which the expansion of Japanese trade had to contend during the last decade, greatly taxed the ingenuity of the Japanese exporters, who had continually to find new devices for overcoming the obstacles they met on their way, for inventing new products to replace those whose exports have become economically impossible, or for opening up new markets.

The outbreak of the European war in 1939, and especially the closing, in the summer of 1940, of the Mediterranean route, following the intervention of Italy, greatly reduced Japanese trade relations with Europe. To this was added the denunciation by the United States of their commercial treaty with Japan, which became effective practically at the same time, and made the re-orientation of Japanese trade urgently necessary. Such re-orientation naturally involved further efforts towards the development of exchanges within the " yen bloc", in so far as these could fill the gap, on the one hand, on the other hand, with the trade with the United States now resting on a precarious basis, without any standing arrangements to regulate its conditions, it led to the intensification of the commercial campaign in Latin America, which offered considerable opportunities for the disposal of Japanese manufactured goods, especially textiles, mechanical and electrical products, etc , as well as for the purchase of petroleum, cotton and certain other primary commodities necessary for the Japanese industries.

Here, the war favoured Japan, because it reduced the competition of European production on Latin-American markets, but this gain was to some extent cancelled out by the restrictions which these countries were compelled to impose on imports in order to protect their trade balance in face of diminishing exports

The organization and development of cooperation within the « yen bloc » formed the subject of an important economic conference which took place in November 1940 at Tokyo between Japan, Manchukuo, occupied China and Inner Mongolia. The conference discussed the division of labour between the countries concerned within the framework of their programme of economic cooperation.

The main lines of this programme involved the creation of a Far-Eastern zone which, without pretending to be economically self-sufficient, would be in a position to meet out of its own resources its vital needs, while each country would help the others in their economic progress. The countries concerned were so to organize their transport and currency systems as to facilitate their economic intercourse with each other. The industrial development of the different countries was to be coordinated so as to enable each to concentrate upon those branches of production for which it is best fitted. Thus, Japan's particular speciality should be the manufacture of instruments of precision, while Manchukuo would concentrate mainly upon electrical and chemical industries. Manchukuo's industry, however, is still in its infancy, the country being essentially engaged in agriculture and primary industries, while China is still more essentially agricultural, so that for the time being their principal contributions are bound to be in foodstuffs and primary commodities, and it is largely out of the proceeds of these branches of production that their industrial development will be financed.

Thus, the scheme of economic cooperation drawn up at the conference of the " yen bloc", needed much time for its carrying into effect. Moreover, it requir-

ed much capital for investment in the exploitation of the latent natural wealth and of the agricultural possibilities of the countries concerned. Much of Japan's exports to the other countries of the "yen bloc", especially Manchukuo, consisted of capital goods: a fact which, under war-time conditions, was bound to create certain difficulties. Indeed, the producers'goods needed by the bloc partners to enable them eventually to meet Japanese requirements in various primary products consisted in machinery, railway equipment, etc., and were thus among the commodities which, especially in the present state of the raw material markets and shipping, it was not in the interest of Japan to export, all the more that they competed with the armaments industries for materials and fuel. Moreover, their export represented essentially an investment of capital and had therefore, as a rule, to be made on terms of long credit, no immediate equivalent imports being obtained.

For the greater part of her essential imports of foodstuffs, particularly rice, and of such primary products as petroleum, iron and other metals, cotton, rubber, etc., Japan had to look either to the United States, with which, however, her trade, since the denunciation of the commercial treaty and in the prevailing conditions of political tension, rested on very precarious foundations, or to other countries of the Pacific area, which could supply the commodities she needed. Thus, Japan was encouraged to develop her trade with Latin America, while carefully following the economic and political developments in the neighbouring zones of the Western Pacific for opportunities there, nearer home. Here, indeed, two events which took place in Europe in the summer of 1940, namely the defeat and the occupation of the Netherlands and of France, and the closing of the Mediterranean routes, have had economic consequences in the East which opened certain commercial prospects for Japan. French Indochina and the Netherlands Indies saw themselves suddently isolated from their principal markets. The situation was particularly grave in French Indochina, as over half of her trade had been with France, and she had to find new sources of supply and new outlets, mostly in neighbouring countries, owing to the dearth of tonnage and to heavy freights. During 1940, therefore, Japan's position on the Indochinese rice market was greatly strengthened, and she became the largest single buyer of this crop. As, however, the recent conflict between French Indochina and Thailand cost the former one of her richest rice-growing regions, Battambang, which had to be ceded, the relative positions of these two countries as rice exporters have lately changed somewhat, so that the future development of Japan's trade with French Indochina is not so clear, the more so that the whole rice export situation in both Indochina and Thailand has been subject, in 1941, to various emergency measures aimed at checking the upward trend in the prices of this product and the excessive speculation in it.

Thus, in the course of the last year or so, Japan's attention turned increasingly in the south-western direction, towards French Indochina mainly for rice and towards the Netherlands Indies for certain other products, such as petroleum and rubber, protracted commercial negotiations having taken place there during this period, which, however, so far, have not brought about any agreement and have, for several months now, been actually interrupted.

All this zone, however, has for years now been living in such a state of perpetual political tension, that the discussion of the developments there from the purely economic standpoint is well-nigh impossible. Economic issues are so closely connected with political problems, that the whole situation appears as a tangle, in which causes and effects are hopelessly confused. It may only be said that, in this vast zone, the economic effects of the European conflict are mostly of secondary importance, being entirely overshadowed by the great regional struggle generally known as the problem of the Pacific. In this struggle, which goes on side-by-side with the great European conflict, and which this latter mainly affects in so far as it produces momentary or more or less durable variations in the relative local weight of the powers concerned, the passing changes in the economic relations which we note here or there are but surface ripples on the ocean, under which deep currents, moved by powerful forces, are at play.

## The Netherlands Indies.

At the beginning of the war, the Netherlands Indies, as well as the other neighbouring countries, French Indochina, Thailand and the Philippines, had considerable expectations of war-time prosperity, which, however, were early disappointed because of the shortage of tonnage and of the strict control of their imports by the belligerent countries. Of the countries of this zone, the Netherlands Indies, however, founds themselves in a somewhat better position than most others, especially French Indochina and the Philippines, because of the nature of her exports, which consisted in the first instance of rubber, and of her strong financial position in the Far East, especially since the Indochinese piastre had lost its former position on the Shanghai money market, and was substituted by the Java gulden.

Rubber, in spite of the elimination of continental European markets, was in great demand, and the export quotas for 1940 were raised by the International Rubber Regulation Committee. In 1940 they averaged 83 3/4 per cent. of the basic figures. The prices of rubber, which, in August 1939, averaged 8.63 *d.* (15.5 cents), rose to 12.7 *d* (21.3 cents), in February and fluctuated between 11 *d* and 13.1 *d* during the period April-June 1940, when the situation was particularly critical. The purchases of rubber by the United States, always the largest single buyer of Netherlands Indies rubber, increased greatly with the expansion of the defence programme and the constitution of reserve stocks. Accordingly, the exports of rubber in 1940 actually increased, reaching a total of over 544,000 metric tons compared with 378,000 tons in 1939, the United States having more than doubled its purchases. Japan has also increased her imports of rubber from the Netherlands Indies. Another leading export product—cinchona-bark and chinine—has also increased, the loss of markets in Europe having been made good by larger British, American and Japanese imports. More or less the same was the case with non-agricultural primary products such as tin and bauxite, while in the case of petroleum the exports remained the same as in 1939, though they fetched somewhat higher prices.

A characteristic feature of the evolution of the economic situation of the Netherlands Indies during the period under review, was the great increase in the share of the United States in both their import and export trade. In 1940, indeed, exports to the United States increased by about 100 per cent., while imports from there rose by about 70 per cent. Next came Japan, with whom the increases were respectively 100 and 20 per cent. European trade, including the United Kingdom, declined by about 25 per cent. in imports and 31 per cent. in exports.

As most other mainly agricultural countries, the Netherlands Indies pursued in the course of the last few years a far-reaching programme of industrialization, which should enable them to attain a higher degree of economic independence and stability. Attention was mainly focused upon the basic metallurgical and chemical industries, including those necessary for defence, as well as on textiles. This work was somewhat handicaped by the war owing to shortage of raw materials and of labour.

## The Near East and Africa.

From the Pacific Area we now pass straight to the Near East and Africa, the intermediate space being occupied by three belligerent countries—Australia, New Zealand and India --belonging to the British Empire.

In the Near East, our attention is called by *Turkey*, whose situation is interesting because, in spite of the many difficulties with which she has been faced during the two years under review, she succeeded not only in avoiding being involved in the war, but even in profiting to a certain extent by the economic opportunities the war offered.

It is true, that the war has had the effect of calling a stop in the Turkish programme of economic development which had been started by the first five-years plan, completed in 1938. This plan, financed by taxes and internal loans, without recourse to foreign capital, helped to consolidate Turkey's position with regard to the basic branches of her agricultural production such as wheat and other cereals, tobacco, sugar, and cotton, as well as of mining, especially in the case of coloured metals and coal. The plan included also industrial development, and the textile, sugar and glass industries were those which made most progress. All this enabled Turkey considerably to increase her export trade and to improve her trade balance.

During the last few years, while continuing to develop her trade with the free-exchange countries, and primarily with the United Kingdom and the United States, from whom she obtained a large part of the industrial products she needed, she has been increasing her trade with the countries of Central and South-Eastern Europe, and particularly with Germany from where she imported industrial and transport equipment, chemicals and other products.

From the very beginning of the war in 1939, Turkey, fully conscious of the complications the conflict was likely to create, took measures for the control of

her foreign trade. This consisted essentially in the prohibition of the export of certain necessary commodities and the introduction of a system of export perm ts. The export trade in the principal commodities was concentrated in the hands of special companies, while the trade in imported goods was also similarly organized, all these organizations being subject to strict government control. In order to avoid a speculative rise in commodity prices, a special organization was established for the control of prices, with price control commissions in the provinces (*vilayets*).

These measures succeeded in fighting down the wave of speculation following the outbreak of the war. The object of these measures was to protect the consumers, while at the same time ensuring remunerative prices to the producers, to whom, moreover, considerable credits were granted for the development of production and the financing of marketing. In those cases in which the closing of foreign outlets produced a temporary congestion on the home market, the Government intervened by buying the surplus. Such intervention took place in the case of cotton, wool, mohair, olive oil, hemp, cereals, etc., a total of over 5,900,000 turkish pounds having been spent by the Agricultural Bank in these operations during the 1939-1940 season.

By carefully controlling imports and exports, and by the re-orientation of the latter towards free exchange markets, the foreign trade situation of the country was greatly improved. Here, however, difficulties had to be surmounted, arising out of the lack of tonnage and the closing of certain routes. This encouraged the development of trade with neighbouring countries: the Balkans, Iraq and Syria. On the import side, war-time conditions, which cut off certain sources and necessitated a strict economy in purchases from abroad, led to a shortage of certain commodities, especially notable in the products of the heavy industry.

About the situation in *Africa* there is very little to say. The Union of South Africa, as well as all the British Crown colonies, are directly involved in the war. Egypt, though not technically belligerent, has a war fought on her territory, and her economy has been put on a war footing since the beginning of war between Italy and Great Britain. For all these countries information is lacking.

All the other African territories, belligerent or not, suffer from being more or less completely cut off their usual European markets. Dearth of shipping and high freights prevent the development of their exports to other destinations. Moreover, some of the colonial territories in Africa, which had in the past concentrated attention upon the production of commodities for export, such as cacao, coffee, copra, fruits, etc., while relying on imported foodstuffs for their own consumption, found themselves in a critical situation and were actually threatened with famine. Some of these colonies, including the French and Belgian possessions which continued to fight on the British side, had, by the end of 1940, to be helped with credits and food by the British Government, being provisionally assimilated in this respect to the British Crown Colonies.

## V. Conclusion.

Writing in the midst of a colossal war which has already shaken the world to its very foundations, and which still expands with growing impetus, it is difficult to draw conclusions. Everything is still in a state of flux, and if we look back, as we have just done, upon the events of the first two years of the conflict, trying to gauge the significance of the changes it wrought in world economy, we cannot help being conscious of the fact that our picture is no more than a snapshot of a momentary situation which further developments may alter beyond recognition.

If, however, we have no other ambition but to record that momentary situation, noting down the changes which took place during the fraction of time represented in the present war by its two initial years—1939-40 and 1940-41—we are in a position to say that, during this period, in spite of the catastrophic nature of the military developments and of their far-reaching political effects, the fundamental trends in world economy have remained characteristically stable.

Indeed, for years past, following the evolution of the world economic situation in our annual surveys, we have singled out for examination, as characteristic of our time, certain definite tendencies. These consisted, in the first instance, of the extension and consolidation of Government planning and control in the various branches of economic activity, which tended continually to impinge upon the domain of competitive economy. Secondly, there was a definite tendency towards economic self-sufficiency or autarchy, which stood in close connection with the development of Government planning and intervention. This tendency, largely, if not wholly, accounted for by military considerations, was greatly accentuated during the years of universal rearmament which preceded the present war. Thirdly, there has been a definite tendency towards the creation or the consolidation of large, more of less self-sufficient, imperial or regional economic spaces or blocs, consisting of countries economically complementary to each other. Economic relations within these imperial or regional blocs were developed at the expense of the constituent countries' trade with the rest of the world.

The war gave a strong impetus to all these movements, forcibly doing away with obstacles and hesitations. Not only in the belligerent countries Government planning and control of economic activities, indispensable in modern war economy, was strengthened and generalized, but the non-belligerent countries have also been compelled to adopt far-reaching measures of regulation of economic life, in order to deal with the repercussions of the war upon their economic and social conditions. Self-sufficiency was also frequently forced upon both the belligerent and the neutral countries for obvious reasons. Finally, imperial and regional pooling of forces became in many cases a necessity, as whole continents found themselves suddenly thrown back upon their own resources, their economic intercourse with the rest of the world being interrupted more or less completely.

Thus, Europe, isolated by the war and the blockade from the other continents, was of necessity compelled to become an autarchic economic space. The economic unity of the "yen bloc" reflected the situation created by the European war and the growing tension in the Pacific. The pan-American movement achieved greater progress during the first two years of the war than it had achieved before since its inception. And while, in forecasting the future, we must always bear in mind the exceptional conditions in which these movements have lately been gaining ground, we may reasonably expect that much of the ground now gained will remain as a permanent acquisition.

## *APPENDIX*

(*Prepared by the* BUREAU OF GENERAL STATISTICS *of the International Institute of Agriculture*)

### WHEAT.

World production in 1939-40 was very high; without being as exceptionally large as in 1938 it was nevertheless larger than that of all the other preceding years, substantially exceeding (by 5 per cent.) even the previous record secured in 1928. This large crop was due, as regards the group of exporting countries, mainly to the fact that the cultivated area was very large, notwithstanding a considerable reduction as compared with the figure for 1938, and in the group of importing countries mainly to the unit yield, which was also very satisfactory, although considerably lower than that secured in 1938. The 1938 crop had been characterised by an abundant yield both in the exporting and in the importing countries; this comparative uniformity was entirely absent in the case of the 1939 crop which gave very different results in the several producing centres. The exporting countries displayed the whole range of possibilities: bumper crops in Australia and Turkey, very satisfactory ones in Canada and North Africa, good crops in the Danubian countries, average in the United States and India, poor and very poor in Argentina and Uruguay. In the case of the importing countries, the variations were less marked, but even in their case there was a great difference between the less than average crops of Spain and France, the barely average crops of the United Kingdom, the good crops of the other European importing countries, and the very large ones secured in non-European importing countries (Syria, Japan, Egypt, etc.).

Considered from the point of view of geographical distribution by continents, the crops in Africa, Asia, and Australasia were very large indeed, marking new records; production in Europe and North America was more or less above the average; South America alone had a really bad harvest.

The 1940-41 harvest differed widely from Continent to Continent. In Europe it was one of the worst of the last few years as a result of the reduction of the area cultivated, of less careful cultivation consequent on the war (hostilities broke out in September 1939 when the preparatory work for sowing was beginning), and more especially of the unfavourable weather conditions: a rainy autumn followed by a very cold winter, with excessive humidity in the late spring and early summer. In the absence of official estimates for several important countries, production can only be very roughly

estimated at some 360 million quintals, being 20 per cent. below that of 1939 and 28 per cent. below that of 1938, both years of very large crops. Compared to the 1933-37 average, the decline still stands at 16 per cent. The crops were particularly poor in France, in the Scandinavian and Baltic countries and in the group of the Danubian countries.

The North American crop was an exceptionally large one, and numbers among the best on record, exceeding all previous ones with the exception of the maximum recorded in 1928. The result of the winter wheat crop in the United States was surprising as at the beginning of the season a large percentage of the wheat planted had not germinated owing to the drought and was apparently lost, but with the improvement in weather conditions, the germination which should have taken place in the autumn took place in the spring, and the weather continued favourable right down to the harvest, so that the crop which in December promised to be a very poor one, and was forecasted at some 100 million quintals, yielded over 160 million quintals, showing an improvement over the first estimate and the final result on a scale never previously recorded by North-American statistics The spring wheat crop was also abundant. Thus the total wheat production in the United States amounted in 1940 to 222 million quintals, as against 205 million in 1939 and an average of 195 million obtained in the previous five year period. At the same time, Canada secured an excellent harvest of 150 million quintals, almost equal to the maximum recorded for that country in 1928. The total wheat crop of North and Central America was thus one of the best of recent years.

As a result of the large crops obtained in India, Turkey and Japan the wheat production of the Asiatic continent was very abundant, being considerably above that of the two record crops of 1938 and 1939, and 25 per cent. above the five-years average for 1933 37.

Owing to the small crops obtained in the countries of the North-Western French zone, the wheat production of Africa was considerably below that of the good 1939 crop. It was nevertheless somewhat above the previous average, thanks to the good crops obtained in Egypt and the Union of South Africa.

Production in South America, which had been very poor in 1939-40, was satisfactory in 1940-41, as the Argentine crop was definitely above the average. On the other hand, the Australian crop was a very poor one, being reduced by half owing to the drought.

To sum up the situation, the wheat harvest in 1940 was excellent in North America and Asia, good in South America, average in Africa, and bad in Europe and Australasia. Taking the world as a whole, the 1940 wheat crop may be described as a good average; although 6 per cent below that of 1939 and 13 per cent. below that of 1938, it was nevertheless considerably above the average for the five-years period 1933-37.

## RICE.

For Asia as a whole, which accounts for about 95 per cent. of the world's rice supply, the crop of 1939-40 was rather a large one, being above the previous five-years average. In Japan, in Thailand, in the Philippines and in the Dutch East Indies results were particularly favorable and record crops were obtained. China had a rather large crop. Good average crops were secured in India, while in Indochina the harvest appears to have been satisfactory. On the other hand, the Burma crop was a poor one owing to the floods which did more harm than usual to the plantations. In Formosa production was below the average, and in Corea the crop was a very poor one.

Among the leading non-Asiatic rice growing countries the United States and Egypt had excellent crops. In Italy and Turkey results were above the average. Spain, on the other hand, had a very small crop.

Total world production, while below the high figures recorded for 1936-37 and 1937-38, was quite satisfactory and above the average.

The results of the 1940-41 crop were less satisfactory than those of the previous year in almost all the great producing countries of Asia. In China unfavourable spring weather conditions in the valley of the Yangtze, characterised by excessive drought, and the unusually heavy rains in some parts of Southern China, caused a considerable reduction in crop yields, which were below the average. Still greater damage was suffered by the Indian rice crop which was 10 per cent. below that of the previous year and 14 per cent. below the average.

The Thailand crop was a decidedly bad one, being the lowest recorded in that country for several years. In Japan the crop was a little below the average and much below that obtained in 1939. In the Philippines it appears that the drought experienced at the time when the ear was forming prevented the crop from reaching the level recorded for the previous year. The exceptionally large crop secured in Burma, the favourable results recorded in Corea and Formosa, and the Indochina crop which seems to have been fairly good, only made up to a small extent for the reduced yields obtained in the above mentioned countries. The aggregate rice production of Asia, excluding China, is roughly estimated at 730 million quintals, a diminution of about 70 millions on the last year's figure and of about 50 millions on the preceding five-years average.

Outside Asia, the United States had a crop which can be described as good, although rather smaller than that of the previous year; Italy had an excellent crop; in Egypt the yield was considerably below that obtained in 1939, which was very abundant.

On the whole, world rice production in 1940-41 was rather low, it was not only smaller than that of the previous year, but also below the average.

### Maize.

The production of maize in 1939-40 in the Danubian countries was on the whole satisfactory with good crops in Rumania and Bulgaria and somewhat less favourable results in Hungary and Yugoslavia. Of the other European maize growing countries, Spain and Portugal had rather large yields, whereas the Italian crop was injured by the drought.

In the United States, although the area planted to maize had been considerably reduced, the crop was a very good one owing to high unit yields which, as a result of extremely favourable weather conditions, were the highest obtained over a long series of years.

In Argentina a considerable increase in the area sown to maize and weather conditions which were on the whole favourable secured one of the largest crops recorded in that country.

In Asia large maize crops were obtained in Manchukuo and in Turkey; in the Dutch East Indies the crop was rather below normal.

In Africa, the crop was smaller than that of the previous year in the Union of South Africa and, to a lesser extent, in Egypt.

As a result of the large crops secured in the United States and in Argentina, the world maize crop, taken as a whole, was the largest obtained since 1932.

In 1940-41 the maize crop in the Danubian countries, in spite of unfavourable weather conditions at the time of sowing and during the early period of growth, was on the whole satisfactory, as the later stages of vegetation were favoured by the weather in most of the regions. As a result, the production obtained on a slightly larger area was about 5 per cent. higher than that of the previous year, and about 9 per cent. higher than the average for the five-years period 1934-38. Among the other leading European producers, Italy obtained a record crop.

In the U. S S. R., the incomplete information available also points to high yields.

In the United States the tendency to reduce the area sown to maize continued in 1940; on the other hand the season was favourable and the yields, while lower than those of 1939, were among the highest recorded in the last twenty years. The harvest, though obtained on an area 7.5 per cent. below that of the 1934-38 period, was 16.8 per cent above the average for those years. As compared to 1939, the area declined by 2.2 per cent. and the production by 5.0 per cent.

In the Argentine and in Uruguay meteorological conditions were very favourable to the crops. Production, which approximated in volume that of the very large crop of the previous year, though grown on a smaller area, was among the largest recorded for those countries.

Good crops were obtained in Manchukuo and in Turkey, where there is a marked tendency to extend the cultivation of maize, as also in the Union of South Africa. In Egypt the crop was only slightly larger than that of 1939 and was below the average.

Altogether, world production was comparable to that of the excellent crop secured in 1939, and exceeded by some 15 per cent. the average of the five previous crop years

POTATOES.

In the early months of the 1939 40 crop year the often cold and rainy weather which was prevalent from March to May, hindered field work and the regular growth of the crops in Europe, which is the most important continent for the production of potatoes. Later on, conditions improved almost everywhere and the yields for the continent as a whole were nearly normal, although below those of the two previous years. There is reason to believe that similar results were secured in the U. S. S. R. In the United States and Canada the potato crops were mediocre.

As a rule meteorological conditions in the 1940-41 crop year were very favorable to potatoes throughout Europe and made it possible to secure large crops. The numerical estimates available, very incomplete but relating to widely different areas, all point to large increases as compared with the previous year, and still more as compared with the average. In several countries, record crops were obtained.

The total production of 14 countries, accounting for about $^4/_{10}$ of the European crop, was 8 % above that of 1939 and 16 % above the average for the five-years period 1934-38.

Even taking into account the fact that in some countries for which estimates are lacking—such as France—the conditions arising from the war, and more especially the scarcity of labour, made it impossible to secure the high yields obtained elsewhere, there is nevertheless reason to believe that the European crop taken as a whole approximated the largest secured in the best years.

In the U. S. S. R. also the results obtained were very satisfactory.

The total production of the United States and of Canada was 11 %. above that of the previous year and 5 % above the average.

## SUGAR.

Weather conditions in 1939, except those at the beginning of the crop year, were very favorable in Europe to the sugar-beet crop. The output of sugar for 1939-40 was 17 per cent. above that for 1938-39 and 11 % above the previous five-year average. The output in the U. S. S. R. was also excellent. The quantities of beet-sugar produced in North America and Asia approached the high figures recorded in 1938-39 and were much above the average.

Thus the world production of beet-sugar in 1939-40 was the highest on record.

At the same time the production of cane sugar was very abundant, and exceeded even the record output for 1936-37. The output was considerably above that of the previous sugar-year in India, Java and Australia.

The total output of cane and beet sugar thus exceeded that of all previous years, being about 7 % above that for the sugar-year 1938-39 and 10 % above the average of the previous five-year period.

The area planted to sugar-beets in 1940 was enlarged in almost all European countries, and was probably the largest ever recorded. Seasonal conditions were on the whole favorable. Nevertheless, taking into account the available statistical data and the general information existing for countries which have not published such data, it would appear that in 1940-41 the production of beet-sugar in Europe was about the same as in 1939-40. This was due to the fact that conditions arising from the war had a marked effect on results in some important beet growing districts, more especially in France and on Polish territory.

The quantities of beet-sugar obtained in the U. S. S. R. were smaller than in 1939-40, while in North America they increased being considerably above the average.

Altogether, the world output of beet-sugar may be taken to be 4 % less than that of the previous sugar-year but much above (nearly 10 %) the average for the five previous years.

In the case of cane-sugar, marketing difficulties have induced some leading exporting countries to reduce their production; the greatest reductions are recorded for Taiwan and Cuba where a decrease of respectively 4,1 and 3,6 million quintals as compared to the 1939-40 crop was registered. Porto Rico, the Dominican Republic, the United States and Australia also reduced their crops. These reductions have only been partially offset by increased yields in some other countries- India, Java, the Philippines, and Mauritius - and for the world as a whole a reduction of some 4 % may be estimated as compared to production for the previous year. Nevertheless, the amount of cane-sugar produced in 1940-41 would appear to be 4 % above the average for the five year period 1934-35 to 1938-39.

For beet and cane-sugar together the world production of the last sugar-year is found to be some 4 % below that of 1939-40, but 7 % above the average for the five previous sugar-years.

## COFFEE.

In Brasil, whence comes 60 % of the total world coffee crop, the tendency to reduce production continues as a result of the over-production which led growers to abandon many of the old plantations which had become economically unprofitable. The 1939-40 crop was 6 % below that of the previous year, 9 % below the previous five year average, and 16 % below the average for the period 1929-30 to 1933-34.

In the other American coffee-growing countries the total production was much the same as that for the previous five-years period, the increases in some countries Columbia, Mexico, Portorico, – being offset by reductions in others Salvador, Venezuela, Haiti.

Most of the coffee-growing countries in Africa increased their production the quantities obtained in Uganda, Angola, Madagascar and the Belgian Congo attained record figures.

In Asia production was a little below the average in the Dutch East Indies and in India.

Taken as a whole, world production was below that of the previous year and was less than average, the smaller Brasilian crop being only partially offset by the larger crops of other producing centres.

For the 1940-41 coffee-year the Brasilian crop showed a further reduction, if the very poor crop of 1935-36 be left out of account, it was the smallest recorded since 1928-29. Apart from the economic considerations which led growers to abandon their old plantations, this result was also due to unfavorable weather conditions and to the injury caused to the plantations by the *Stephanadores*.

In all the other American coffee-growing countries the crops were larger, or at least equal to those of the previous year.

In most countries of Africa the tendency to increase production is still felt. In India and the Dutch East Indies average crops were secured.

Taken as a whole the world production of coffee fell even below that for the previous season, the total being markedly affected by the decline in the size of the Brasilian crop.

World production in 1940-41 was thus the lowest recorded in the last ten years, after that for 1931-32 and 1935-36.

## COTTON.

The cotton-year 1939-40 was characterised by a further reduction of the area planted to cotton in the United States, in British India and in Egypt.

Weather conditions in the United States favored the ripening, picking and ginning of the cotton crop. In British India vegetation started badly, but the condition of the growing crops improved later on and yields were normal. In Egypt, the season was on the whole favorable and definitely better than in the previous year.

Thus the total output of the three above mentioned countries came nearly up to that for 1938-39, and although the area planted to cotton had been reduced by 14 %, the crop was only 8 % below the average of the previous five-years period.

The tendency to increase the cultivation of cotton continued in 1939-40 in several of the South-American countries. In the U. S. S. R. the crop was the largest recorded for that country. On the other hand, it appears that China had a poor crop.

Taken as a whole, the quantities of cotton obtained in 1939-40 were much the same as those recorded for the previous year which were the largest obtained in the world after the record crops of 1936-37 and 1937-38.

The areas planted to cotton in the 1940-41 cotton-year were much the same as those of the previous year in the United States, somewhat larger in Egypt, and showed a marked increase in British India as compared with the low level to which they had fallen in 1939-40

In each of the three countries mentioned weather conditions were even more favorable than in the previous year, and allowed of good yields. Total production exceeded that of 1939-40 by over 3 million quintals, or nearly 9 % and although the area planted was 12 % smaller, the crop was equal to the average for the five year period 1934-35 to 1938-39.

In the other leading producing countries, crops larger than those of the previous year were obtained in Brasil, where production reached the highest figure so far recorded, and in China On the other hand, the crop was poorer in the U. S. S. R.

Taken as a whole, the world cotton crop of 1940-41 was 7 % above that obtained in 1939-40, and exceeded the figures registered for all previous years, apart from the exceptionally large crops obtained in the two years 1936-37 and 1937-38.

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(*) *List of abbreviations:* bihebd. (biweekly); bimens. (twice monthly); bimestr. (every two months) déc. (every ten days); étr. (foreign price); fasc. (copy); hebd. (weekly); int (home price); irr. (irregular) mens. (monthly), n°. (number); N. S. (new series); p. a. (per annum), q (daily); sem. (half yearly); s. (series); trihebd. (every three weeks); v. (volume); trim. (quarterly).

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AGRICULTURAL STATISTICS

# MONTHLY CROP REPORT AND AGRICULTURAL STATISTICS

*The following explanations refer to crop conditions quoted in the crop notes and in the tables. — Crop condition according to the system of the country. Germany, Bohemia and Moravia (Protectorate); Hungary: 1 = excellent, 2 = good, 3 = average, 4 = poor, 5 = very poor; Finland: 8 = very good, 6 = above the average, 5 = average; France: 100 = excellent, 70 = good, 60 = fairly good, 50 = average, 30 = poor; Romania and Sweden: 5 = excellent, 4 = good, 3 = average, 2 = poor, 1 = very poor, Netherlands: 90 = excellent, 70 = good, 60 = fairly good, 50 = below average; Portugal: 100 = excellent, 80 = good, 60 = average, 40 = poor, 20 = very poor, Switzerland 100 = excellent, 90 = very good, 75 = good, 60 = fairly good, 50 = average, 40 = rather poor, 30 = poor, 10 = very poor; U. S. S. R: 5 = good, 4 = above the average, 3 = average, 2 = below average, 1 = poor; Canada: 100 = crop condition promising a yield equivalent to the average yield of a long series of years; United States: 100 = crop condition which promises a normal yield; Egypt 100 = crop condition which promises a yield equal to the average yield of the last five years — For other countries the system of the Institute is employed: 100 = crop condition which promises a yield equal to the average of the last ten years*

NOTE *The countries are listed throughout by continents (Europe, followed by the U. S. S. R., America, Asia, Africa and Oceania) in the French alphabetical order In the tables the Northern Hemisphere precedes the Southern Hemisphere*

***See latest information at page 364.***

## *VEGETAL PRODUCTION*

### WHEAT CROP PROSPECTS FOR 1941 IN THE NORTHERN HEMISPHERE

From the data received at the Institute in July and from the different sources of information available, an endeavour has been made to estimate the probable wheat crop in the northern hemisphere. As has been repeatedly stated, however, a comprehensive and true estimate for all Europe is out of the question at the present moment, in view of the unavoidable difficulties in the information services of most European countries. Of necessity, therefore, one must be content with the approximate estimates obtained from the rather vague and incomplete news available at the moment and which are here summarized.

Following on a rather cold, wet and stormy spring, the summer began dry and sunny with occasional showers. The gradual rise in temperature, so necessary to the crops, especially in central and southern Europe, brought about regular maturation in most districts, despite occasional showers and even violent storms which caused some damage, generally of a local character and of little importance. Sirocco winds and heat waves were infrequent in the more southern zones, often subject to serious losses during the final stage of growth. On the whole, as far as is known, the end of the season was favourable for the normal ripening of wheat and rye, and most countries report an appreciable improvement in the situation as compared with last month.

While at the beginning of June the majority of the European countries for which fairly reliable information was available, anticipated crops to be close to average, at the beginning of July, these same countries were more optimistic and estimated their crops as good average, satisfactory and in some case even good. The average production of Europe, excluding the Soviet Union (within the 1938 boundaries), in the ten years from 1930 to 1939 was 1,570 million bushels, with a maximum of 1,835 millions in 1938 and a minimum of 1,360 millions in 1930. Last month it was anticipated that the 1941 harvest would give a total result not very different from the above metioned average. This month, in view of the improvement in the reports from many countries since the beginning of summer, perhaps this figure could be rised at least slightly. Account, however, must be taken of war operations which, in June, extended over vast areas of Eastern Europe and of the further direct and indirect damage caused in the regions of importance as regards wheat and rye production. Consequently, in view of the impossibility of estimating the entity of this damage, we believe it advisable to keep unchanged the conjectural forecast made last month and to assume as probable amount of the 1941 wheat crop the figure of 1 580 million quintals which is practically the average. As the crop in Europe last year, according to the very approximate estimate, did not appear to exceed 1,360 million bushels, the crop this year promises to be definitely superior, presenting a difference of about 220 million bushels more.

As regards rye, yields are generally expected to be better than for wheat.

All that can be said for the Soviet Union is that the condition of the crops before the outbreak of hostilities, promised a good harvest, the harvesting of wheat and winter rye had already begun in the southern regions with satisfactory results. Sowing of spring crops was about completed when war operations began.

In North America, June was not a very favourable month for the wheat crop, neither in the United States nor in Canada, and prospects are less satisfactory than a month ago.

In the United States the new estimate for the winter wheat crop based on the condition of the crops on July 1 has fallen by about 15 million bushels as compared with the preceding etimate. Despite this decrease, the winter wheat crop with 682 million bushels is one of the best recorded in the United States to date, representing an increase of 15.8 per cent. over last year's prouction and of 16 5 per cent. over the previous five-year average. This result is partly due to the fact that planting losses during the winter were very small this year and partly because the unit yield anticipated for 1941 is very high and even higher than that of 1940, which is considered as one of the best recorded up to date. It is estimated at 16.9 bushels per acre as against 16.3 last year and 14.2, the average for the previous five-year period. The first official estimate for the spring wheat crop indicates a total of 241 million bushels, that is, an increase of about 14 millions over the good harvest of last year and of approximately 65 millions or 37 per cent. over 1935-39 averge. Thus the total wheat production in the United States is anticipated at about 924 million bushels as against 817 in 1940 and 762, the average for the previous five-year period. After covering home requirements, this would leave a surplus of at least 260 million bushels, which would be added to

the already heavy stocks carried over from last year. During the first three weeks of July, the harvesting of the winter wheat proceeded rapidly and the growth of the spring wheat, owing to the favourable weather conditions, continued to be satisfactory, so that the good prospects at the beginning of the month do not seem to be affected to any extent.

Estimates for Canada are less definite, as the area sown to spring wheat will not be known until next month. The official report on the condition of the crops on June 30 indicates an appreciable drop as compared with the beginning of the month, the crop condition falling from 98 to 80 owing to the lack of rain in the Prairie Provinces. Supposing that the area actually sown corresponds to that intended by the farmers as shown from the enquiry made by the Department of Agriculture at the beginning of May, the total crop of winter wheat and spring wheat may be estimated at about 300 million bushels as against 551 millions last year and the 1935-39 average of 312 millions. It would appear then that this year's crop will be rather mediocre owing to the appreciable reduction in area sown and the fairly low unit yield. It seems however, that during the first half of July prospects became more optimistic following the arrival of the rains in the Prairie zone.

In conclusion, the indications given on the condition of the crops on July 1 seems to confirm a fairly good crop for the whole of North America, with a total of 1,230 million bushels. This total production which also includes the estimated small crops in Mexico and Colombia, is below than the 1940 crop (1,385 millions) but appreciably exceeds the previous five year average (1,000 millions).

Of the Asiatic countries, India has slightly reduced the first estimate of 382 million bushels to 372 million. The 1941 production, therefore, presents a decrease of about 30 millions as compared with last year but practically equals the average. Turkey anticipates a more or less average crop, which represents an outturn of about 145 million bushels. In Japan, production is expected to be slightly lower (58 million bushels as against 66 in 1940) but appreciably higher than the average. In the other countries of the Near East, Iraq, Syria, Palestine Trans-Jordan the harvest appears abundant. According to the widely approximate estimations made, the Asiatic crop for 1941 will reach 660 million bushels, with a decrease of 40 millions as compared with 1940, but will exceed the average by 30 millions.

In North Africa, the production of the three countries in the French zone is expected to be better than that, fairly mediocre, of last year and slightly more than the average. Egyptian production seems to be more or less the same as in 1940.

To sum up, the wheat crop prospects in the countries of the Northern Hemisphere and the approximate estimates of the probable results which can be expected, taking as a basis the information at present available, are combined in the following table. These indications are naturally subject to considerable changes and corrections not only because of their largely approximate character but also according to weather conditions between now and the end of the harvest.

The 1941 crop in the Northern Hemisphere, therefore, may be expected to be slightly higher than that of 1940 and the previous five-year average. In the group of exporting countries, the figures show a decrease as compared with 1940,

*Wheat crop prospects for 1941 in the Northern Hemisphere in July.*

(Million bushels)

| Year | Europe | North and Central America | Asia | Africa | Total |
|---|---|---|---|---|---|
| 1941 (forecast) . . . . . . . . | 1,580 | 1,230 | 660 | 130 | 3,600 |
| 1940 (approximate figures) . . . | 1,360 | 1,385 | 700 | 115 | 3,560 |
| 1939 (definitive figures) . . . . . | 1,695 | 1,295 | 665 | 150 | 3,805 |
| 1938 » » . | 1,835 | 1,310 | 680 | 120 | 3,945 |
| 1937 » » . . . . | 1,550 | 1,070 | 630 | 120 | 3,370 |
| 1936 » » . . | 1,480 | 805 | 605 | 95 | 3,045 |
| 1935 » » . | 1,575 | 920 | 580 | 115 | 3,190 |
| 1934 » » . . | 1,550 | 815 | 555 | 135 | 3,055 |
| 1929 1933 (average) . . . . | 1,500 | 1,160 | 550 | 120 | 3,330 |

owing to the considerable drop expected in Canada where the wheat crop shows a decided regression because of the large stocks left unsold in previous years, caused by the closing of the European market. Despite this decrease in the exportable surplus of the new Canadian crop, the stocks accumulation in the north American exporting countries will still undergo a new increase, if the production of the countries in the Southern Hemisphere are even average.

The situation which at present is fairly satisfactory on the whole in Argentina and Australia makes this conjecture probable.

G C.

## CURRENT INFORMATION FROM VARIOUS COUNTRIES ON WHEAT, RYE BARLEY AND OATS.

*Belgium:* After June 15 the weather improved considerably and the prospects for the new crop are favourable, in spite of the fact that the delay of about two weeks in the development and formation of the grains still persists.

The Spring barley harvest began on July 15th. Under the influence of the great heat, Rye is ripening quickly On the whole the harvest appears to be good, but owing to the drought the yield will probably fall a little short of expectations.

*Bulgaria* According to a statement by the Minister of Agriculture, the cereal harvest was in progress all over the country at the end of June. While the barley harvest was nearly completed, that of wheat was still in full swing, excepting in the southern districts In spite of the lack of labour, it is expected that the harvest and threshing of wheat will be completed in normal time, thank to the measures taken by the Government.

On the whole, the forecast of the cereal crops is good.

The weather, generally warm and sunny, of the second part of June has been favourable to the ripening of cereals. In the southern districts of Bulgaria, and in Macedonia the harvest of barley started at the beginning of June.

A large number of schoolboys has been sent to the country to help farmers during the cereal harvest.

*Croatia:* Wheat harvest operations had begun nearly everywhere by the middle of July. A very good crop is expected.

*Denmark:* The condition of the chief cereal crops on July 1, 1941, compared with that on July 1, 1940 was as follows: wheat 74 (69), rye 90 (84), barley 88 (87), oats 86 (82), meslin 86 (81).

*Spain:* After the middle of June the weather took a favourable turn for the cereal crops, which were generally very late as a result of bad weather conditions during May. The prospects of the wheat crop have therefore as a result, improved considerably. In many districts the wheat acreage is bigger than last year.

It is confirmed in all provinces that barley production is good.

*Finland:* According to the report of the Chamber of Agriculture, the crop forecast was, at the beginning of July, better than last year's notwithstanding the lateness of the Spring. There has been some complaint of lack of rain over a large part of the country. Crop condition at the beginning of July, compared with the corresponding date last year (indicated in brackets) was as follows: Winter wheat 4.6 (4.[illegible]), spring wheat 4.7 (5.1), rye 5.5 (4.3), barley 4.7 (5.0), oats 4.7 (5.0), meslin 4.6 (5.0).

*Greece:* The warm southerly winds which blew from the middle of April until the middle of May and the absence of rain during May and the first half of June, gave rise to some concern in respect of cereal crops.

Better weather conditions prevailed, however, during the second half of June, and the situation has considerably improved in such a way as to be described more than satisfactory.

Wheat and barley harvest operations have begun in many districts.

*Hungary:* During the weeks from June 21st to July 4 the weather was rather hot and dry.

At the beginning of July the Wheat early sowings appeared in good condition. As a result of heavy storms, certain seedlings had been overturned. Late sowings were irregular, invaded by weeds and late in development.

At that time the Rye harvest had begun in some places. Over most of the country the Rye crop was in full ripening. Ears were fairly long but not very full in many places.

The Winter barley harvest had also begun, and in some southern districts it was even completed. Ears are quite long, the grains are big and of good quality.

Spring barley and Oats were developing well, being favoured by the weather. The state of the early sowings of these two cereals is fairly good as a rule, while the late sowings are sometimes irregular and infested by weeds.

The official forecast based on the state of crops on July 1st is as follows:

Wheat, near the average;

Rye, average;

Winter barley, average;

Spring barley, slightly above the average;

Oats, average.

During the first half of July the temperature went gradually up, and many storms have been reported. The official crop forecast, based upon the situation at the middle of July, has changed very little by comparison with that at the beginning of the month.

On July 15th the forecast was as follows:
Wheat, average production;
Rye, average production;
Winter barley, production a little above the average,
Spring barley, average production;
Oats, average production.

*Rumania:* During the two weeks ending June 24, the weather was more or less wet throughout the country. At this date, harvesting of winter barley had already begun in the lowlands. The successive week ending July 1 was more favourable for grain maturation and harvesting. In the Danube plain, the winter barley had been harvested and the harvesting of the wheat and spring barley crops had begun.

The weather during the week July 2-9 was again wet and cold throughout the country with the exception of Oltenia Harvesting operations were frequently interrupted.

Although as yet no estimation may be given of the grain crop, it appears certain that this year's wheat crop is much superior to the very poor crop of last year. The rains during the first half of July damaged the wheat in quality to some extent.

*Serbia* The latest information confirms the forecast of a good wheat crop, probably larger than last year's.

*Slovakia* At the beginning of July condition of cereal crops was satisfactory. In some districts harvest had already started.

*Switzerland* The fine weather of the last few weeks has caused a surprising recovery of the cereal crops, which now appear to be in a satisfactory condition. Winter wheat, rye and spelt are as a rule in good condition and promise normal yields. Flowering has taken place regularly, the stems are stronger and dampness is rare. Spring wheat which, at the beginning, was giving rise to some concern, has recovered quite well. Oats, on the other hand are rather thick in recently ploughed up fields, and have slightly suffered from dampness in places, as a result of heavy showers. During the first ten days of July there were violent storms, which apparently caused great damages.

The following table shows the condition of the various crops, expressed in the form of index-numbers (basis a very good crop made equal to 100):—

| | July 1, 1941 | June 1, 1941 | July 1, 1940 |
|---|---|---|---|
| Winter Wheat | 82 | 76 | 68 |
| Spring Wheat | 77 | 73 | 77 |
| Winter Rye | 82 | 78 | 72 |
| Spring Rye | 77 | 69 | 79 |
| Winter Barley | 82 | 76 | 70 |
| Spring Barley | 76 | 74 | 80 |
| Oats | 82 | 79 | 81 |
| Meslin | 82 | 79 | 76 |
| Spelt | 82 | 81 | 74 |

At mid-July weather conditions were marked by hail and heavy storms.

*Argentina:* Weather conditions in June were favourable to cereal crops.
At the end July weather conditions have been favourable to winter cereals.

*Canada:* According to the Dominion Bureau of Statistics, prospects for all of the 1941 grain crops of Canada were generally less good on June 30 than on May 31 and rather below normal. Condition figures for all Canada on June 30, 1941, expressed in percentages of the long-time (1908-1940) average yields per acre, are as follows:

| Crops | Condition of grains crops in percentage 1941 June 30 | 1941 May 31 | 1940 June 30 |
|---|---|---|---|
| Winter wheat | 86 | 91 | 99 |
| Spring wheat | 80 | 98 | 96 |
| All wheat | 80 | 98 | 96 |
| Winter rye | 83 | 89 | 86 |
| Spring rye | 86 | 95 | 92 |
| All rye | 84 | 91 | 88 |
| Oats | 87 | 94 | 92 |
| Barley | 89 | 91 | 92 |
| Mixed grain | 81 | 94 | 96 |
| Buckwheat | 85 | ... | 93 |

The areas of grain crops, with comparisons, are as follows

| Crops | 1941 (1 000 acres) | 1940 (1 000 acres) | Average 1935-39 (1 000 acres) | % 1941: 1940 = 100 | % 1941: Average = 100 |
|---|---|---|---|---|---|
| Winter wheat | 581.2 | 775.4 | 652.1 | 75.0 | 89.1 |
| Spring wheat | 21,074.3 | 27,950.8 | 24,943.5 | 75.4 | 84.5 |
| All wheat | 21,655.5 | 28,726.2 | 25,595.0 | 75.4 | 84.6 |
| Winter rye | 646.2 | 785.0 | 635.4 | 82.3 | 101.7 |
| Spring rye | 270.2 | 249.3 | 181.0 | 108.4 | 149.3 |
| All rye | 916.4 | 1,034.0 | 816.4 | 88.5 | 112.3 |
| Oats | 13,827.2 | 12,297.6 | 13,246.4 | 112.4 | 104.4 |
| Barley | 5,393.0 | 4,341.5 | 4,291.4 | 124.2 | 125.7 |
| Mixed grain | 1,191.7 | 1,219.9 | 1,166.0 | 97.7 | 102.2 |
| Buckwheat | 302.0 | 325.7 | 376.6 | 92.7 | 80.2 |

*United States:* During the week ended July 3, 1941, high temperatures and local showers resulted in generally favourable conditions in the principal agricultural sections. Harvesting of winter wheat progressed well and spring wheat development was good to excellent

During the week ending July 10, the weather was favourable for agriculture and prospects were promising. Following rains in drought areas, most crop were in good condition. Harvesting and threshing of winter wheat made good advance and conditions continued favourable for spring wheat.

The following week beneficial rains fell in the North-East, following which midsummer moisture situation was unusually favourable throughout the country. Harvesting of winter wheat progressed well in the northern sections, and conditions were favourable to spring wheat.

During the week ending July 25, conditions were slightly less favourable for agriculture, with too much rain in the south, but scanty in the other sections. Threshing of winter wheat was progressing well and condition of spring wheat crop continued favourable, except for high temperatures hastening maturity.

According to the July report on condition and probable yield, a total wheat crop of 923,613,000 bushels (554,168,000 centals) is indicated. This is 13.1 percent more than last year's actual crop of 816,698,000 bushels (490,019,000 centals) and 21.1 per cent. more than the 5-year (1935-39) average production of 762,385,000 bushels (457,431,000 centals). The July 1 acreage for harvest of all wheat is 56,783,000 acres, an increase on last year's harvested acreage (53,503,000 acres) of approximately 3.3 million acres, or 6.1 per cent. and a decrease of 1.4 per cent. from the 5-year (1935-39) average of 57,573,000 acres. There was an increase of nearly 4.2 million acres in winter wheat and a decrease of 889,000 acres in spring wheat.

The estimate of winter wheat indicated production is 682,321,000 bushels (409,393,000 centals), an increase of 15.8 per cent on last year's actual crop of 589,151,00 bushels (353,491,000 centals) and one of 16.5 per cent. on the 5-year (1935-39) average production of 585,778,000 bushels (351,467,000 centals). This prospective production was being harvested on an estimated area of 40,316,000 acres, 11.5 per cent more than last year's harvested acreage (36,147,000 acres) but 2.1 per cent. less than the 5-year (1935-39) average of 41,186,000 acres. The expected unit yield is so nearly 21 per cent. above the 5-year average yield.

All spring wheat production (including durum) is estimated at 241,202,000 bushels (144,775,000 centals), compared with 227,547,000 bushels (136,528,000 centals) in 1939, an increase of 6.0 per cent., and the 5-year (1935-39) average of 176,606,000 bushels (105,964,000 centals), an increase of 36.6 per cent. The area being harvested amounts to 16,467,000 acres, compared with 17,356,000 acres actually harvested in 1939, and the 5 year average of 16,467,000 acres; percentages 94.9 and 100.5. The unit yield is expected to exceed by nearly 40 per cent the 5-year average yield.

The total area under rye for harvest in 1941 is 3,436,000 acres, compared with 3,192,000 harvested in 1940 and the 5-year average of 3,722,800; percentages 107.6 and 92.3. The corresponding production is estimated at 48,570,000 bushels (27,204,000 centals) against 40,601,000 (22,737,000) and 45,672,000 (25,576,000); percentages: 119.6 and 106.4

The area under barley is 13,977,000 acres compared with 13,394,000 in 1940 and 10,774,000 acres the 5 year average, percentages. 104.4 and 120.7. The corresponding production is 338,307,000 bushels (162,431,000 centals), against 309,235,000 (148,433,000) and 236,270,000 (113,409,000); percentages: 109.4 and 143.2.

The area under oats is 37,236,000 acres, compared with 34,847,000 in 1940 and 35,417,000 the 5-year average; percentages 106.9 and 105.1. The corresponding production amounts to 1,212,783,000 bushels (388,091,000 centals) against 1,235,628,000 (395,401,000) and 1,029,279,000 (329,369,000), percentages 98.2 and 117.8

*Mexico.* Wheat production in 1940 has been estimated at 8,002,000 centals (13,337,000 bushels) as against 8,863,000 centals (14,771,000 bushels) in 1939 and the average of 6,932,000 centals (11,553,000 bushels) during the previous five years, percentages: 90.3 and 115.4. The 1940 crop has been obtained from an area of 1,450,000 acres, which is 2.9 per cent. greater than that of 1939 and 19.4 per cent. greater than the average acreage during the previous five years. The moderate results obtained in 1940 are due to the rather unfavourable season.

*India:* According to the fourth estimate acreage cultivated to wheat amounts to 34,409,000 acres, compared with 33,673,000 (revised) in 1940 and 34,262,000 the average for the five preceding years; percentages: 102.5 and 100.7. The second estimate of production amounts to 223,306,000 centals of wheat (372,176,000 bushels) compared with 238,358,000 (397,264,000)--revised—and 220,922,000 (368,204,000); percentages: 93.7 and 101.1.

*Japan*. The production of wheat in 1941 is estimated at 34,858,000 centals (58,096,000 bushels) against 39,682,000 (66,135,000) in 1940 and an average of 30,078,000 (50,130,000) in 1935 to 1939, percentages, 87.8 and 115.9

*Algeria*. The production of cereals this year, according to press information, is superior to last year's. Production of wheat is estimated at 19,200 thousand centals (32,000 thousand bushels) against 16,560 (27,600) in 1940 and an average of 20,890 (34,816) in 1935 to 1939, percentages 115.0 and 91.9. Production of barley is estimated at 15,360 thousand centals (32,000 thousand bushels) against 7,920 (16,500) and 15,415 (32,114), percentages 193.9 and 99.6. Production of oats is estimated at 2,560 thousand centals (8,000 thousand bushels) against an average of 3,387 (10,585), percentage 75.6.

*Angola*. Thanks to the activity of the "Junta de Cereais" wheat production has been increased this year and is estimated now at 154,000 centals (265,000 bushels).

*French Morocco*. The cereal harvest has been satisfactory from the point of view of both quantity and quality.

## THE WORLD OUTPUT OF MAIZE IN 1940-41 (1)

By Dr. B. Desmirlani

In March and April 1940, at the sowing time for maize in the Northern hemisphere, three important factors may have influenced the decisions of the farmers as to the extent to be given to the cultivation of maize

(1) the continuation of the war in Europe and consequent ever growing restrictions upon trade,

(2) the exceptional size of the Argentine crop which was being harvested just then

(3) the continuation of the agrarian policy of the United States which tended to a gradual decrease of the area under maize.

In Europe, the continuation of the war brought about a growing interference of the governments in the drawing up of plans of cultivation, and contributed in several countries to increase the importance of the culture of maize, as the use of the latter for bread making became general in Eastern Europe and in Italy.

The very big maize crop in Argentina, which was harvested in March and April 1940, could hardly influence at all the intentions of farmers in the maize growing European countries, given the ever increasing difficulties of exportation from Argentina to Europe. On the other side, this big crop has enhanced the tendency towards reducing the area under maize in the United States.

### I. — The area under maize.

Given the predominant importance of the United States for the growing of maize in the Northern Hemisphere, the decrease of the aerea under maize in that country implies a reduction of the maize growing area in the whole hemisphere.

(1) We are dealing here with the maize harvested chiefly in October 1940 in the Northern Hemisphere and in March and April 1941 in the Southern Hemisphere.

The area upon which maize was sown in the United States was in 1940 relatively speaking so small that one had to go as far back as 1898 in order to find an almost equal one. The area sown un 1940 amounted to 88,100,000 acres, as compared with 91,100,000 acres in 1939 and an average of 97,800,000 acres in the five years 1934-1938; this meant a decrease of 3,3 per cent as comcompared with 1939, and of 9.8 per cent as compared with the said average.

From 1936 to 1940, the decrease was no less than 12,500,000 acres, a figure nearly equal to the average yearly area under maize in Romania.

In the Danube countries, there have taken place, in 1938, 1939 and 1940, far-going territorial changes, which will have some repercussion also upon the output of, and trade, in maize of that group of States. In the autumn of 1938 and the spring of 1939, a maize-area of about 272,000 acres, which yielded some 5.9 million bushels of maize, passed from former Czecko-Slovakia to Hungary. As the output of maize in the regions so transferred (especially in Subkarpathia) is deficient, a surplus of Hungarian maize will have to be sent there. Thus in future a natural consequence of this change will be an intensified cultivation of maize either in those territories or else in other parts of Hungary. In 1940, Romania ceded to Bulgaria and to Hungary territories which included respectively 207,000 and 815,000 acres maize growing land. For Bulgaria, there will result from it a substantial increase of her possibilities of exporting maize. In the case of Hungary, there may be foreseen on the contrary a decrease of the exportable surplus, on account of the annexation of Northern Transylvania, the maize output of which is again insufficient. Both these territorial changes have taken place between countries belonging to the same Danube group, and thus their effects upon the output of, and the trade in maize of that group as a whole counter-balance each other. During the same year, Romania has ceded to the Soviet Union Bessarabia and Northern Bukovina, where maize had been grown on the average, in the years 1934 to 1938, upon 2,700,000 acres, the yield amounting to 39 million bushels. Thus, as a consequence of the territorial changes made in the years 1938 to 1940, on one side the area under maize in the whole of the four Danube countries increased by about 272,000 acres and its yield of maize by some 5.9 million bushels on account of the cession to Hungary of territories of former Czecho Slovakia, and on the other side the same area decreased by 2.7 million acres and its yield by 39 million bushels on account of the annexation of Bessarabia and of Northern Bukovina by the Soviet Union. The balance of all territorial changes for the Danube group of countries shows a loss of an average area under maize of about 2.4 million acres and of an output of some 33.1 million bushels.

The area under maize of the four Danube countries (excluding the territories ceded to the Soviet Union) may be estimated to have amounted in 1940 to 21.7 million acres, as compared with 21.3 million acres in 1939 and with an average of 21.5 million acres in 1934-1938, the increase being of 2.9 and 0.8 per cent. respectively.

For the group of European countries which are at the same time producers and importers of maize (Italy, Spain, Portugal, France, Greece, Germany and Switzerland), statistical data are available as to this crop only for Italy

(which is the most important producing country of this group), Spain and Switzerland. In these three countries, we see an increase of the area as compared both with 1939 and with the average for 1934-1938. In Italy, the increase was 3.4 per cent as compared with 1939, and 1.9 per cent as compared with the said average. In the case of the the whole group of the seven countries mentioned above, the increase in the area may be estimated as having been of some 2 per cent.

For the whole of Europe, less the Soviet Union with Bessarabia and Northern Bukovina, the area under maize in 1940 may be estimated to have amounted to 29.9 million acres, as compared with 28.9 million acres in 1939 and an average of 29.4 million acres in the years 1934 to 1938.

In the Soviet Union (without Bessarabia and Northern Bukovina) the tendency towards reducing the cultivation of maize prevailed again in 1940. In fact, the area under maize foreseen by the plan for 1940 amounted to only 5,328,000 acres, as compared with 6,148,000 acres in 1939 and an average of 7,630,000 acres in the years 1934 to 1938, this meant a decrease of 13.4 per cent as compared with 1939, and of 30.2 per cent. as compared with the said average.

On the contrary, the cultivation of maize has developped very rapidly during the last years in the Manchukuo. In 1940, the area under maize was 5,600,000 acres, as compared with 4,900,000 acres in 1939 and only 3,300,000 acres on the average in 1934-1938, this meant an increase by 15.4 per cent. as compared with 1939, and by not less than 71.7 per cent. as compared with the said average. In Turkey, we also notice a certain growing tendency, but the pace of the increase in the area under maize is slower there, an the proportions smaller.

In Egypt, which is the most important producer among the North African countries, the culture of maize has shown in the last years only slight fluctuations, even if the tendency was a decreasing one. In 1940 the area under maize amounted to 1,599,000 acres, as compared with 1,606,000 acres in 1939 and with an average of 1,604,000 acres in 1934-38.

To sum up, we may estimate that the area under maize in the whole Northern hemisphere (less the Soviet Union with Bessarabia and Northern Bukovina and China) was in 1940 almost equal to that of 1939 and some 2,700,000 acres less than the average for 1934-38, viz. 148,800,000 acres in 1940 as compared with 149,000,000 acres in 1939 and an average of 151,500,000 acres in 1934-38. The positive decrease in the area under maize in the United States was to a large extent compensated by the increase in the Manchukuo.

In the Southern hemisphere, the state of the cultivation of maize is to a large extent determined by the Argentina, which is the second largest producer in the world. On account of the exceptionally big crop of 1939-40 and of the growing difficulties of exportation ad well as because of the unfavourable conditions at sowing time in 1940-41, the sown area decreased in the Argentina to 15,100,000 acres, as compared with 17,800,000 acres in 1939-40 and with the average of 15,900,000 acres for the previous five years. Taking also into account the statistical figures published in the Union of South-Africa and in Uru-

guay and the data available for the other producing countries, we may estimate the area under maize in 1940-41 for the whole Southern hemisphere as having been of 39,800,000 acres, as compared with 42,300,000 acres in 1939-40 and with an average of 37,800,000 acres in the preceding five years.

*Maize area in the World by hemispheres.*

(Million acres)

| Hemispheres | 1940 (1940-41) | 1939 (1939/40) | Average 1934-1938 (1934/35-1938/39) | % of 1940 (1940-41): 1939 (1939/40) = 100 | % of 1940 (1940-41): Average 1934-1938 (1934/35-1938/39) = 100 |
|---|---|---|---|---|---|
| North Hemisphere (¹) | 148.8 | 149.0 | 151.5 | 99.8 | 98.2 |
| including United States | (86.4) | (88.4) | (93.4) | (97.8) | (92.5) |
| South Hemisphere (²) | 39.8 | 42.3 | 37.8 | 94.2 | 105.2 |
| including Argentina | (15.1) | (17.8) | (15.9) | (84.7) | (94.5) |
| **World total** (¹) | **188.6** | **191.3** | **189.3** | **98.6** | **99.6** |
| including United States and Argentina | (101.5) | (106.2) | (109.3) | (95.6) | (92.9) |

(1) Less the Soviet Union (with Bessarabia and Northern Bukovina) and China — (2) Sown area.

The total of the data relating to the area under maize in both hemispheres gives for the world area under maize in 1940 (1940-41) an approximative figure of 188,600,000 acres, as compared with 191,300,000 acres in 1939 and with an average of 189,300,000 acres in the preceding five years, this means a decreaes by 1.4 and 0.4 per cent respectively.

## II - The progress of the season and the yields obtained.

In the United States, the weather was rather cool and rainy at sowing time and during the first phase of vegetation. In the second half of June and the first week of July, a rapid growth of the plants was reported, but rain hindered agricultural work. The state of the crops on July 1 allowed to foresee a good yield. In the second half of July and in the first half of August, dry and hot weather prevailed, so that the harvest prospects grew less favourable, especially in the Western maize zone (Kansas).

Rains, which fell in the main maize growing zone in the second half of August, once more improved the outlook. The month of September was rather cool, but generally speaking favourable to the crops. The September frost found maize already mature, and did no damage. In the first week of October, maturation was general, and thus there was assured a fourth consecutive crop of high yields per acre and of a rather big total output.

In the following table are shown the six official monthly crop reports figures which reflect the influence of the weather conditions upon the outlook for the period from July to December.

*United States. — Variations of the official forecasts of maize production during July to December 1940.*

| Date of the reports | Million bushels of 56 lb. each |
|---|---|
| 1 July 1940 | 2,416 |
| 1 August | 2,248 |
| 1 September | 2,297 |
| 1 October | 2,352 |
| 1 November | 2,434 |
| 1 December | 2,449 |

The yield per acre obtained in the United States amounted in 1940 to 28.3 bushels, as compared with 29.4 bushels in 1939. The 1940 yield was exactly equal to that of 1937 and has been exceeded only four times in the course of the last twenty years, viz. in 1920, 1921, 1923 and 1939. The highest yield per acre ever reached in the United States was the one of 1906: 31.7 bushels per acre.

*Yield of maize in certain countries.*

Bushels of 56 lb. per acre.

| COUNTRIES | 1940 (1940-41) | 1939 (1939-40) | Average 1934-1938 (1934-35 1938-39) |
|---|---|---|---|
| United States | 28.3 | 29.4 | 22.5 |
| Canada | 37.4 | 44.1 | 40.3 |
| Mexico | 8.1 | 9.7 | 8.9 |
| *Total of three countries* | *26.6* | *27.9* | *21.5* |
| Yugoslavia (1) | 24.7 | 23.1 | 27.1 |
| Italy | 36.2 | 28.2 | 32.5 |
| Spain | 26.1 | 30.1 | (2) 27.8 |
| Switzerland | 43.0 | 41.1 | 46.0 |
| *Total of four countries* | *28.5* | *25.3* | *28.8* |
| Manchukuo | 21.5 | 19.6 | 24.1 |
| Egypt | 37.6 | 37.3 | 39.7 |
| Argentina (1) | 27.2 | 22.9 | 19.4 |
| Uruguay | 10.4 | 9.7 | 10.0 |
| *Total of two countries* | *26.6* | *22.6* | *19.1* |
| **TOTAL OF ELEVEN COUNTRIES** | **26.8** | **26.8** | **22.1** |

(1) Yields calculated on the basis of the sown area. — (2) Average of 1934 and 1935.

In Canada and Mexico, weather conditions were less satisfactory, and the yields per acre lower than in 1939 and on the average in 1934-1938.

In the four Danube countries (Hungary, Yugoslavia, Romania and Bulgaria), the weather was cool and very wet at the beginning of the sowing period (April and May 1940) The germination was irregular in various places. Big floods took place, especially in Hungary and in Yugoslavia, making necessary new sowings of maize and of other crops The month of June was generally rainy in all Danube countries. In July, hot and dry weather prevailed, but the plants did not suffer from droughts, except in Eastern Bulgaria. In August, rain fell in time to assure a normal development of the crops A late autumn allowed a full maturation of the plants almost everywhere, safe in Hungary, where about 13 per cent of the crop did not mature. The ratio of moisture in the grains was very high, especially in Hungary and in Yugoslavia.

The yield per acre in Romania (within the area left after the territorial cessions) amounted to 18.8 bushels, as compared with 19.6 bushels in 1939 and with an average of 15.9 bushels in 1934-1938 in the former territory. The 1940 output would have been no doubt higher if the agricultural work (weeding) could have been performed under normal circumstances, and not while mobilisation was proceeding. In Hungary, (including the annexed Northern zone and Subkarpathia), the yield per acre in 1940 was 35 1 bushels, as compared with 29.5 bushels in 1939 in the ancient territory plus the annexed Northern zone, and with an average of 31 8 bushels in 1934-38 within the former territory alone On the contrary, the yield per acre in Yugoslavia was, although higher than the very low one of 1939, much less than the average for 1934-38, especially on account of the excessive dampness that prevailed during the first phase of vegetation

In Italy, weather conditions were particularly favourable for the cultivation of maize, so that there could be reached the highest absolute output of maize of the last twenty years and a yield of 36.2 bushels per acre (see table), the second best after that of 1937, which had given 36.8 bushels per acre.

In the Soviet Union, the autumn of 1940 was rather rainy, and the maturation of maize belated Consequently, the ratio of moisture in the grains was above the average.

A rather satisfactory progress of the season in 1940 may be deduced from the yield per acre obtained in Spain, in Switzerland, in the Manchukuo and in Egypt.

As to the Southern hemisphere, weather conditions were particularly favourable for the maize crops in the Argentina and in Uruguay. The Argentina registered in 1940-41 a yield of 27.3 bushels per acre, as compared with 23.0 bushels in 1939-40 and with an average of 19 5 bushels in the preceding five years. This yield, which has been calculated upon the basis of the sown area, i. e. without taking into account possible later destructions, is rather high for the Argentina, where the highest yield per acre for the last seventeen years was one of 30.5 bushels in 1930-31.

For the whole of the eleven countries considered in the preceding table, we get in 1940 (1940-41) a yield per acre of 26.8 bushels, equal to the one of 1939 (1939-40), compared with an average of 22.1 bushels in the five preceding years. If these figures do not show exactly the respective world-yields, they are anyhow

representative enough and allow us to say that during the two consecutive campaigns of 1939 (1939-40) and 1940 (1940-41) weather conditions were in the whole generally speaking very favourable for the culture of maize

## III — The world output of maize.

The output of maize in the United States is in general so large that it exceeds by itself half the production of the whole world In fact the average output of the five years 1934 38 which reached 2 097 million bushels, although it included the two very deficient crops of 1934 and 1936 represented 51 8 per cent of the output of the whole world (less the Soviet Union and China) Thus the United States maize production in any year characterises not only that of the Northern hemisphere but the one of the whole world as well

*United States maize crop*

| Years | Area Planted | Area Harvested | Area lost | % of area lost to planted area | Production | Yield, bushels per acre: of planted area | Yield, bushels per acre: of harvested area |
|---|---|---|---|---|---|---|---|
| | 1 000 acres | 1 000 acres | 1 000 acres | | 1 000 bushels | bushels acre | bushels acre |
| [illegible] | | | | | | | |
| [illegible] | 96 7 | 97 8 | 6 8 | | 94 1 | | |
| Average 1934-38 = 100 | 90 | 97 [illegible] | 39 [illegible] | | 116 8 | | |
| 1940 | 88 14[illegible] | 86 449 | 1 [illegible]94 | 1 9 | [illegible] 449 [illegible]0 | 27 8 | 28 3 |
| 1939 | 91 1[illegible]8 | 88 430 | 2 [illegible] | [illegible]0 | [illegible]0[illegible] 1[illegible]3 | 29 6 | [illegible]9 4 |
| *Average 1934-38* | *97 76* | *93 4[illegible]8* | *4 334* | *4 4* | *[illegible]09[illegible] 088* | *21* | *[illegible]2 4* |
| 1938 | 93 689 | 9[illegible] 222 | 1 467 | 1 [illegible] | [illegible] 56[illegible] 197 | [illegible]7 [illegible] | [illegible]7 8 |
| 1937 | 96 342 | 9[illegible] 741 | 2 601 | 2 7 | [illegible] 651 284 | [illegible]7 5 | 28 3 |
| 1936 | 100 599 | 93 0[illegible]0 | 7 57[illegible] | [illegible] | 1 507 089 | 15 0 | 16 2 |
| 1935 | 98 37[illegible] | 95 804 | [illegible] 5[illegible] | [illegible] | [illegible]0[illegible] 747 | [illegible]4 | [illegible]4 0 |
| 1934 | 99 80[illegible] | 92 [illegible]4 | [illegible] 4[illegible]2 | 7 5 | 1 461 1[illegible] | 14 [illegible] | 15 8 |
| *Average 1929-33* | *105 7[illegible]4* | *104 544* | *1 210* | *1 1* | *2 [illegible]01 5[illegible]* | *23 7* | *23 9* |
| 1933 | 108 527 | 10[illegible] 963 | [illegible] 564 | [illegible] | [illegible] 399 632 | [illegible] | 22 6 |
| 1932 | 112 061 | 110 [illegible]77 | 1 484 | 1 [illegible] | [illegible] [illegible]31 281 | 2[illegible] | 26 5 |
| 1931 | 108 469 | 106 912 | 1 557 | 1 [illegible] | [illegible] 57[illegible] 611 | [illegible]7 | 24 1 |
| 1930 | 101 813 | 101 [illegible]65 | [illegible]48 | 0 [illegible] | [illegible] 080 421 | [illegible]0 4 | 20 5 |
| 1929 | 97 898 | 97 805 | 93 | 0 1 | [illegible]21 0[illegible] | 2[illegible] 8 | 25 8 |
| *Average 1924/28* | *100 162* | *99 979* | *183* | *0 [illegible]* | *[illegible] [illegible]70 070* | *2[illegible] 7* | *25 7* |
| 1928 | 100 399 | 100 336 | 63 | 0 1 | 2 66[illegible] 516 | [illegible]6 5 | 26 6 |
| 1927 | 98 460 | 98 357 | 103 | 0 1 | [illegible] [illegible] 120 | 2[illegible] 6 | 26 6 |
| 1926 | 99 660 | 99 452 | 208 | 0 [illegible] | [illegible] [illegible]46 97[illegible] | 25 6 | [illegible]5 6 |
| 1925 | 101 413 | 101 331 | 82 | 0 1 | 2 798 367 | 27 6 | 27 6 |
| 1924 | 100 879 | 100 420 | 459 | 0 [illegible] | 2 223 1[illegible]3 | 22 0 | 22 1 |

The sown area shows in the United States since 1932 except in 1936, a marked tendency to decrease. The decrease from 1932 to 1940 amounted to 23 000 000 acres, and was thus equal to the average area under maize of the four Danube countries (Hungary, Yugoslavia, Romania and Bulgaria) This tendency has been, since 1934, promoted by the Federal government, in order to keep up the price of maize

The harvested area does not reflect only the tendency determined by the will of the agriculturists, but also the vicissitudes of weather conditions. It may be of use to remark that, in the United States, the harvested maize area includes both the one upon which maize was havrested (*a*) for grain and (*b*) for silage and (*c*) the area hogged down and grazed, and in general the area used for forage.

The difference between the sown area and the harvested one, such as it has been defined above, is the « lost » area. The loss in question has fluctuated between 0.1 and 0.5 per cent of the sown sera from 1924 to 1930. From 1931 to 1940, the loss was always above 1.3 per cent., and reached by way of exception 7.5 per cent in the two drought years 1934 and 1936. In these two years, the « lost » area was about 7,500,000 acres.

The output shown in the table represents the production of maize for all purposes (for grain, silage, grazing and forage), as transformed in grains Since 1936, the last year of a heavy drought, the United States had four consecutive big crops: 2,651,000,000 bushels in 1937, 2,652,000,000 bushels in 1938, 2,602,000,00 bushels in 1939 and 2,449,000,000 bushels in 1940. As the harvested area went on decreasing during these four years, the increased output was due to yields per acre above the average.

The maize output of Mexico and Canada was in 1940 lower than in 1939, but almost equal to the average of 1934-38. The total maize output of the United States, Mexico and Canada in 1940 taken together amounted to 2,523 million bushels, as compared with 2,689 million bushels in 1939 and with an average of 2,169 million bushels in the preceding five years; thus it was by 6.2 per cent. less than in 1939, but by 16.3 per cent. more than the average for 1934-38.

In the case of the other important region of the world output of maize, the four Danube countries, it is difficult to supply exactly comparable figures, given the territorial changes of 1938, 1939 and 1940. On the whole, the maize output of these countries increased by some 5.9 million bushels as a result of the annexation by Hungary of territories of former Czecho-Slovakia, and decreased by 39 million bushels on account of the cession of territories by Romania to the Soviet Union. Thus the said changes have implied a loss of about 33.1 million bushels in the maize output of the Danube region.

Although no comparable statistical figures are available on the matter, it may be said that in Romania (without Bessarabia and Northern Bukovina) the output was in 1940 rather big, as it exceeded the 1934-38 average by some 15 per cent., and was only slightly lower than the 1939 production. The cession of territories deprived Romania of an area upon which some 59.1 million bushels were harvested. In order to compensate this loss, the Romanian government tries to improve the technics of maize cultivation, so as to increase the very low local yield per acre.

Yugoslavia harvested in 1940 172,400,000 bushels of maize, as compared with 159,300,000 bushels in 1939 and with an average of 184,000,000 bushels in 1934-38, i. e. 8.3 per cent. more than the low output of 1939, and 6.6 per cent. less than the average.

The output of Hungary (without Northern Transylvania) amounted to 116,700,000 bushels, as compared with some 94.5 million bushels in 1939 and with an average of about 96.8 million bushels for 1934-38 (the latter figures being calculated ones). This output was very large, and exceeded by more than 20 per cent. those of both 1939 and the average of 1934-38. It may be useful to note, however, that the ratio of moisture of the Hungarian 1940 crop was an exceptionally high one. In fact, according to a special statistical report published on November 21, 1940, out of a production of 116.7 million bushels of maize, nearly 15.4 million bushels, i. e. 13.2 per cent., have not reached full maturity.

According to an unofficial estimate, the output of Bulgaria (without Southern Dobrudja) was a very large one, as it exceeded that of 1939 by more than 10 per cent.

For the whole Danube region (without Bessarabia and Northern Bukovina), the maize output of 1940 may be estimated to have amounted to 519.7 million bushels, as compared with 496.0 million in 1939 and with an average of 476.4 million bushels for 1934-38; thus it was larger by 5 and 9 per cent. respectively.

Of the European countries which are both producers and importers of maize (Italy, Spain, Portugal, France, Greece, Germany and Switzerland), Italy, the most important producer of this group, had in 1940 an exceptionally large output, as it reached 135,100,000 bushels, as compared with 101,700,000 bushels in 1939 and with an average of 118,800,000 bushels in 1934-38. The 1940 output very nearly reached the level of 138 million bushels, which is officially stated to be sufficient to cover the Italian consumption of maize.

The maize output of the next important country of this group, Spain, in 1940 was by 12 per cent. smaller than the big one of 1939.

To show the increasing importance of maize in Europe under the present circumstances, there was registered in Switzerland in 1940 an increase in the output of 31 and 62 per cent. as compared with 1939 and with the average for 1934-38 respectively.

For the whole group of European countries which are both producers and importers of maize, the maize output of 1940 may be estimated to have been of 209 million bushels, as compared with 181 million bushels in 1939 and with an average of 189 million bushels for 1934-38, i. e. to have been larger by 17 and 12 per cent. respectively.

If we add together the foregoing data of the two groups of countries and take into account the other less important producers as well, the 1940 output of all Europe (less the Soviet Union with Bessarabia and Northern Bukovina) may be estimated to have amounted to 756 million bushels, as compared with 705 million bushels in 1939 and with an average of 689 million bushels in 1934-38 showing a increase of 7,3 and 9,7 per cent respectively

In the case of the Soviet Union, statistics as to the output stop at 1938. Official figures are available only for yields per hectare in the collective holdings of the Ukraine (as it was before the annexation of Bessarabia and Northern Bukovina); they amounted to 32.7 bushels per acre in 1940, as compared with 27.1 bushels in 1939 and with 22.5 bushels in 1938. We may note that,

out of the total area under maize in the Ukraine, about 90 per cent. come from collective holdings. During the five years 1943-38, the Ukrainian area under maize represented some 37 per cent. of the maize growing area of the whole Soviet Union, which amounted to 7,631,000 acres.

In Asia, Manchukuo and Turkey substantially increased their cultivation of maize, so that their whole output reached in 1940, 150.8 million bushels, as compared with 124.8 million bushels in 1939 and with an average of only 100.8 million bushels in 1934-38; this means an increase of 20.8 and 49.5 per cent. respectively.

The Egyptian output was, in 1940, 60.2 million bushels, as compared with 60 million bushels in 1939 and with an average of 63.6 million bushels in 1934-38. In that country, the yearly fluctuations of the crop are of but little importance, but a general tendency towards a reduction of the crop results from a decrease of the area under maize.

The output of the Northern hemisphere (less the Soviet Union with Bessarabia and Northern Bukovina and China) may be estimated to have amounted in 1940 to 3,732 million bushels, as compared with 3,823 million bushels in 1939 and with an average of 3,232 million bushels in 1934-38. The decrease in the United States output as compared with 1939 was to a large extent compensated by increases in Europe and in the Manchukuo, so that the production of the Northern hemisphere in 1940 was only 91 million bushels, or 2.4 per cent. less than in 1939, but 500 million bushels, or 15.5 per cent. more than the 1934-38 average.

In the maize production of the Southern hemisphere, the Argentina occupies by far the foremost position. In fact, that country is the second producer of maize in the world (coming immediately after the United State) and the first exporter of the same cereal. Thus it may be of use to examine in detail the statistics relating to its maize output in the course of the last years.

The series of sown areas shows a very rapid development of the cultivation of maize in the Argentina during the last seventeen years. While the quinquennial average was only 10.6 million acres in 1924-25 to 1928-29, it rose to 14.6 million acres in 1929-30 to 1933-34, and to 15.9 million acres in 1934-35 to 1938-39.

As the Argentina exports almost 80 per cent. of this output, the rapid development of the culture of maize shows that the possibilities of sale of the Argentina maize upon the world markets remained good ones during the last years. The decrease of the sown area in the campaign ended in March-April 1941, as compared with the previous one, was due above all to the difficulties of exportation met with on account of the present war. If the war still continues at next sowing time, in September-October 1941, the sown area will no doubt decrease still more in the Argentina in the 1941-42 campaign. The harvested area is defined in the Argentina in a different manner than in the United States. In the Argentina, is called « harvested » the area upon which maize has been harvested for grain, and the term does not include the grazed area, as is the case in the United States. The difference between the sown area and the harvested one represents the « lost » area, i. e. both the area the output of which has been destroyed and the one that has been grazed off. Consequently, no comparison may be made between the

*Argentina Maize crop.*

| Years | Area: Planted | Area: Harvested | Area: Area lost | % of area lost, Planted = 100 | Production | Yield: bushels per acre: of planted area | Yield: bushels per acre: of harvested area |
|---|---|---|---|---|---|---|---|
| | 1 000 acres | 1,000 acres | 1,000 acres | % | 1 000 bushels | bushels acre | bushels acre |
| % of 1940/41 | | | | | | | |
| 1939-40 = 100 | 84 7 | | | | 100 7 | | — |
| Average 1934-35 — 1938-39 = 100 | 94 5 | | | | [illegible] 4 | — | — |
| 1940-41 | 15 068 | | | | 411 401 | 27 3 | |
| 1939-40 | 17 792 | 14 073 | 3 719 | 20 9 | 408 448 | 23 0 | 29 0 |
| *Average 1934-35 — 1938-39* | *15 938* | *10 704* | *5 234* | *32 8* | *310 692* | *19 5* | *29 0* |
| 1938-1939 | 13 097 | 8 654 | 4 443 | 33 9 | 191 488 | 14 6 | 22 1 |
| 1937-1938 | 15 319 | 7 308 | 8 011 | 52 3 | 174 166 | 11 4 | 23 8 |
| 1936-1937 | 15 052 | 10 777 | 4 275 | 28 4 | 340 153 | 22 6 | 31 6 |
| 1935-1936 | 18 854 | 12 689 | 6 165 | 32 7 | 395 701 | 21 0 | 31 2 |
| 1934-1935 | 17 369 | 14 091 | 3 278 | 18 9 | 451 950 | 26 0 | 32 1 |
| *Average 1929-30 — 1933-34* | *14 567* | *10 212* | *4 355* | *29 9* | *304 861* | *25 9* | *29 9* |
| 1933-34 | 16 097 | 10 161 | 5 936 | 36 9 | 256 917 | 16 0 | 25 3 |
| 1932-33 | 14 540 | 9 374 | 5 166 | 35 5 | 267 765 | 18 4 | 28 6 |
| 1931-32 | 14 468 | 9 518 | 4 950 | 34 2 | 299 334 | 20 7 | 31 4 |
| 1930-31 | 13 776 | 11 578 | 2 198 | 16 0 | 419 668 | 30 5 | 36 2 |
| 1929-30 | 13 955 | 10 428 | 3 527 | 25 3 | 280 671 | 20 1 | 26 9 |
| *Average 1924-25 — 1928-29* | *10 590* | *8 678* | *1 912* | *18 1* | *276 562* | *26 3* | *32 1* |
| 1928-29 | 11 832 | 8 694 | 3 138 | 26 5 | 252 412 | 21 3 | 29 0 |
| 1927-28 | 10 739 | 8 803 | 1 936 | 18 0 | 311 602 | 29 0 | 35 4 |
| 1926-27 | 10 539 | 9 001 | 1 538 | 14 5 | 320 853 | 30 3 | 35 4 |
| 1925-26 | 10 618 | 9 635 | 983 | 9 3 | 321 641 | 30 3 | 33 4 |
| 1924-25 | 9 162 | 7 195 | 1 967 | [illegible] 5 | 186 301 | 20 3 | 25 9 |

« lost » areas of the United States and those of the Argentina. If the maximum of loss amounted in the United States in the last years to 7.5 per cent of the sown area, it reached 52.3 per cent in the Argentina, this divergence being obviously due to the different definitions of « lost » areas.

During the seventeen years considered in the table, the « lost » area fluctuated between 983,000 acres (9.3 per cent of the sown area) in 1925-26 and 8,011,000 acres (52.3 per cent) in 1937-38, when an exceptional drought destroyed a great part of the crop. The increase in the ratio of losses may in part be explained by the extension of maize cultivation to regions where the success of the crop was less certain. During the last two years (1939-40 and 1940-41) a good part of the « lost » area was made up of crops grazed off standing (*consumida en planta*) on account of the low price of maize not covering the cost of harvesting. Thus, in 1939-40, the « lost » area consisted, according to a provisional official estimate, up to 42.9 per cent in destroyed crops and up to 57.1 per cent in crops grazed off standing.

Notwithstanding the growing tendency of « lost » areas, the Argentina maize output has followed an ascending line during the seventeen years considered, on account of the big increase in the sown area. In 1930-31, the output exceeded for the first time 10 millions of metric tons, owing to a very high yield per acre

(36.2 bushels) and to a low ratio of losses (16 per cent. of the sown aera). Since then, production has exceeded 10 millions of metric tons four times again: in 1934-35, 1935-36, 1939-40 and 1940-41. Thus, within the last ten years, Argentina had twice two very big crops in succession following each time upon three poor ones.

The last two big crops have put the Argentina government before problems of an exceptional difficulty. The huge stocks available for exportation coulds neither be sent to Europe in account of the war nor kept at home owing to a lack of suitable storage accomodation.

The government did all it could in order to increase the utilasation of maize at home for human consumption (maize bread, polenta and biscuits), for feeding cattle, for producing alcohol, and even as combustible for railway engines and private homes.

The 1940-41 output of maize in the Argentina, which reached 411.4 million bushels, was the third one according to size, coming as it did after those of 1934-35 (451.9 million bushels) and 1930-31 (419 7 million bushels)

Uruguay had also a very big maize crop in 1940-41, as it exceeded by 20 1 and by 10 3 per cent. respectively that of 1939-40 and the average for the preceding five years.

The Argentina and Uruguay produced together in 1940-41 four million bushels more than in 1939-40.

The Union of South Africa which, in good crop years, holds third place among the maize-producing countries of the Southern Hemisphere (coming after Argentina and Brazil) in the 1940-41 season, produced 85 million bushels as against 74 million bushels in 1939-40 and 79 million bushels, five-year average, that is an increase of 14.9 and 8.1 per cent. respectively.

According to the data shown above, and taking into account the information obtained as to probable crops in the other important producing countries of the Southern hemisphere, the output of the latter may be estimated to have

*World production of the maize, by hemispheres.*

(Million bushels of 56 lb.)

| HEMISPHERES | 1940 (1940/41) | 1939 (1939/40) | Average 1934-1938 (1934/35-1938/39) | % of 1940 (1940/41): 1939 (1939/40) = 100 | % of 1940 (1940/41): Average = 100 |
|---|---|---|---|---|---|
| North. Hemisphere (1) | 3 732 | 3,823 | 3,232 | 97.6 | 115.5 |
| including United States | (2,449) | (2,602) | (2,097) | (94.1) | (116 8) |
| South. Hemisphere | 886 | 870 | 776 | 101.8 | 114.2 |
| including Argentina | (441) | (408) | (311) | (100.7) | (132.4) |
| *World total* (1) | *4,618* | *4,693* | *4 008* | *98.4* | *115 2* |
| including United States et Argentina | (2,860) | (3,010) | (2,408) | (94.9) | (118.6) |

(1) Excluding the U. S. S R., China, Bessarabia and Northern Bucovina.

amounted in 1940-41 to 886 million bushels, as compared with 870 million bushels in 1939-40 and with an average of 776 million bushels in the preceding five years; this would mean an increase of 1.8 and 14.2 per cent. respectively.

By adding the estimates made for both hemispheres, we obtain an output of the whole world (less the Soviet Union with Bessarabia and Northern Bukovina and China) of 4,618 million bushels in 1940 (1940-41), as compared with 4,693 million bushels in 1939 (1939-40) and with an average of 4,008 million bushels in the preceding five years, i. e. 1.6 per cent. less than in the previous year, but 15.2 per cent. more than the said average.

If we consider that even during the quinquennial period of 1929-33 (1929-30 to 1933-34) the average world output of maize was only 4,279 million bushels, we may say by way of conclusion that the last two world crops of maize were particularly abundant ones, on account of very big harvests coinciding in the two main producing countries, the United States and the Argentina.

## CURRENT INFORMATION ON MAIZE.

*Greece:* The condition of the maize crop, sown in April, was considered in June as satisfactory. Maize sowings were continued in higher districts, but owing to the dry weather, prospects were not favourable.

*Hungary:* Maize has developed irregularly in many places.

Early sowings have improved considerably, but their development was still late at the beginning of July. Hoeing was still in progress. Late sowings have developed excepting in those parts where, owing to glow temperatures and excessive moisture, the plants had grown yellow and their development was late.

*Romania:* The maize crop benefited considerably by the June rains. Towards mid-July, maize hoed in time made a good show. This season, the success of the crop will depend largely on cultivation care.

*Canada:* According to the Dominion Bureau of Statistics, the area under maize for grain is 190,000 acres, compared with 186,000 in 1940 and the 5-year average 1935-39 of 172,200, percentages 102.2 and 110.3. Crop condition at June 30, 1941 was 89 per cent. of the long-time (1908-1940) average yield per acre, against 83 last year.

*United States:* According to the July report total area under maize is 85,043,000 acres against 86,449,000 in 1940 and 92,043,000 on the average of the five years ending 1939, percentages: 98.4 and 92.8. The corresponding production is estimated at about 1,427,557,000 centals (2,549,100,000 bushels) against 1,371,552,000 (2,449,200,000) and 1,302,162,000 (2,325,290,000); percentages 104.1 and 109.6.

During the week ending July 25, the maize crop was in its critical stage. Crop condition was generally from good to excellent, and weather conditions in the East were favourable.

*Angola:* Thanks to the activity of the "Junta de Cereais" production of maize has increased and is estimated to amount this year at 3,350,000 centals (5,980,000 bushels).

## CURRENT INFORMATION ON RICE.

*Bulgaria:* The Office in charge of purchases and exports of cereals has published the following communiqué: " The Council of Ministers have decided, at a meeting held on June 14, to create a monopoly of the trade in cleaned and rough rice of the 1941 crop, and this monopoly has been entrusted to the Office in charge of purchases and exports of cereals ".

*United States:* According to the July report the area under rice this year is 1,180,000 acres against 1,051,000 in 1940 and 1,000,000 on the average of the five years ending 1939; percentages. 112.8 and 118.0 The corresponding production is estimated at about 26,172,000 centals (58,160,000 bushels) against 23,730,000 (52,754,000) and 22,398,000 (49 774,000), percentages 110.2 and 116,8

## CURRENT INFORMATION ON POTATOES.

*Belgium:* During the third week of June the potato crop appeared to be in good condition, in spite of some damage caused in some places, by drought, especially to the late varieties. The rain which fell during the fourth week was beneficial. The acreage allotted to early potatoes is barely one half of that of former years, and this is due to the relative scarcity of " Eertelingen " plants, which used to be imported in large quantities from Holland. The lifting of this variety began on June 30. Measures are being taken in order to ensure a uniform distribution of the crop among the population The lifting of the half-early and late varieties, whose prospects are favourable, will be probably carried out more easily.

Early potatoes were, ripening by the middle of July. The crop is satisfactory.

*Croatia:* The rain that fell at the beginning of July has been beneficial to potatoes.

*Denmark.* The condition of the crop on July 1 was 90, as against 89 at the corresponding date last year.

*Finland·* According to the report of the Chamber of Agriculture, the condition of the potato crop at the beginning of July was, as expressed in that country, 5.0, as againt 5.2 at the corresponding date last year.

*Hungary·* The early potato crop made its first appearance on the market towards the end of June. At that time the late varieties were in full flowering, excepting in the northern and eastern districts. Tuber development was good. A production somewhat higher than the average is expected.

During the first half of July the state of the potato crop remained good, and the forecast is the same as at the beginning of July.

*Slovakia:* At the beginning of July, condition of potatoes crop was better than average.

*Switzerland:* The condition of the potato fields is not very uniform, and the crop is still late in development. Early plantings, in particular, are progressing rather slowly, but on the other hand the crops of choice seed and the late plantings promise in general good yields. Some varieties appear to be threatened by virus disease, or, according to the soil, by other diseases. Generally speaking, however, we may say that potatoes promise a good crop, even if slightly smaller than that of last year.

**The condition of the potato crop at the beginning of July was indicated, according to the local method, by the figure 74, as against 73 on June 1, 1941 and 85 on July 1, 1940**

*Argentina* The production of potatoes was in 1940-41 26,015,000 centals (43,357,000 bushels) as against 23,612,000 centals (39,352,000 bushels) in 1939-40, and an average of 14,728,000 centals (24,546,000 bushels) during the previous five years, percentages 110.2 and 176.6. The production of the current season is the highest ever obtained by that country excepting that of 1930-31 and its abundance is chiefly due to the considerable increase of acreage.

*Canada* According to the Dominion Bureau of Statistics the area under potatoes is 52[illegible],300 acres against 545,000 in 1940 and 515,000 the 5-year average 1935-39, percentages 96.8 and 10[illegible]. Crop condition as of June 30, 1941 was 93 per cent of the long-time (1908-40) average yield per acre against 94 last year.

*United States* According to the July report the area under potatoes this year is [illegible]4,000 acres against 3,053,000 in 1940 and [illegible]66,000 on the average of the five years ending 1939, percentages 95.1 and 91.7. The corresponding production is estimated at about [illegible] centals ([illegible] bushels) against [illegible] ([illegible]) and [illegible] ([illegible]), percentages [illegible] and 99.3.

## SUGAR SEASON

In the first days of June the sugar-beet crop in Europe was still backward but conditions on the whole were satisfactory.

During June and up to the middle of July, weather conditions continued to be favourable.

In Northern Europe a very hot summer followed closely on a late spring. In the beginning the beet crop benefited by this weather but with the prolonged heat some of the crops suffered a little from the drought. In other districts however localized heavy rains caused some damage but in any case neither the drought nor the rains have appreciably affected the general favourable outlook.

In the sugar beet regions of Central Europe the weather after a wet and cold period in June gradually improved and became very hot about the middle of July with occasional storms on the outlying zones. In general the beet crop is good and, in some of the more northern districts is excellent even though in some parts growth is somewhat retarded.

The condition of the beet crops in Southern Europe is to some extent even more satisfactory especially in the Balkan countries which benefited from alternate rain and hot sunny days, while in the more western countries dry weather is setting in.

Taking into consideration that the area under sugar beet in Europe this year exceeds that of last year and that on the whole, crops are in good condition, a good harvest may be expected from the beet crop in Europe, probably superior to that of 1940.

*Acreage of Sugar-beet.*

| COUNTRIES | 1941 (1) | 1940 | Average 1935 to 1939 | % 1941: 1940 = 100 | % 1941: Average = 100 |
|---|---|---|---|---|---|
| | acres | | | | |
| *Germany | ... | (2) 2,000,000 | 1,199,460 | ... | ... |
| Belgium | (3) 119,480 | (3) 118,961 | 120,352 | 100 | 99 |
| *Bohemia-Moravia | ... | 351,000 | 319,512 | ... | ... |
| Slovakia | (3) 47,000 | (3) 47,000 | (2) (4) 35,337 | 100 | 133 |
| Bulgaria | 50,000 | 40,000 | 22,638 | 125 | 218 |
| Denmark | (3) 116,900 | 109,000 | 97,784 | 107 | 120 |
| *Spain | ... | 136,000 | 191,500 | ... | ... |
| Finland | 8,200 | 8,200 | 10 127 | 100 | -- |
| France | (2) 502,000 | (2) 282,000 | 578,680 | 178 | 87 |
| Hungary | 227,000 | (5) 180,000 | 104,727 | 126 | 217 |
| *Ireland | ... | 65,000 | 54,646 | ... | ... |
| Italy | 320,000 | 363,000 | 287,536 | 88 | 112 |
| *Netherlands | .. | 119,800 | 106,178 | .. | .. |
| Romania | 120,000 | 90,649 | 97 134 | 136 | 127 |
| *United Kingdom | ... | 350,000 | 342,901 | ... | ... |
| Sweden | 131,200 | 134,200 | 127,884 | 98 | 103 |
| Switzerland | 8,600 | 8,280 | 6,002 | 104 | 144 |
| *Yugoslavia | .. | 125,000 | 71,185 | ... | ... |
| *Total Europe (a)* | *1,650,380* | *1,381,290* | *1,488,201* | *120* | *111* |
| U.S.S.R | (6) *3,072,000* | (6) *3,027,000* | *2,984,978* | *101* | — |
| *Total Europe (b)* | *4,722,380* | *4,408,290* | *4,473,179* | *107* | *106* |
| Canada | 71,000 | 78,100 | 52,860 | 91 | 134 |
| United States | 761,000 | 916,000 | 828,220 | 83 | 92 |
| *Total North America* | *832,000* | *994,100* | *881 100* | *84* | *94* |
| *Japan | ... | 46,500 | 45,572 | ... | .. |
| Turkey | 120,498 | 104,144 | 66,109 | 116 | 182 |
| *Total Asia* | ... | ... | ... | ... | ... |
| TOTALS (a) | **2,602,878** | **2,479,534** | **2,435,410** | **105** | **107** |
| TOTALS (b) | **5,674,878** | **5,506,534** | **5,420,388** | **103** | **105** |

* Not included in the totals. — (a) Not including U.S.S.R. — (b) Including U.S.S.R. — (1) Approximate data. — (2) Licht's estimate. — (3) Datum of the International Association for Sugar Statistics. — (4) Average of two years — (5) Including the reannexed northern zone and Sub-Carpathia — (6) Actual boundary.

If so much may be affirmed for the Europe of the 1938 frontier, excluding the U. S. S. R., it would be rather hazardous to come to the same conclusion as regards all Europe comprising the U. S. S. R., as the present German-Russian conflict which has now broken out is partly being carried out in Ukraina which is one of the chief beet-growing zones, consequently, it is not easy to estimate the losses involved.

As regards cane sugar, according to the latest information received, the situation has changed to some extent. Recent reports from Argentina, the United States, Jamaica, Dominican Republic, Trinidad and the Indies show an increase while the latest figures from Brazil, Puerto Rico, St Kitts, Mauritius and Hawaii show a decrease. Taken on the whole, the situation has improved, with a consequent rise in world production of cane sugar. In fact, the total production of cane sugar this eason which, according to the early reports, was estimated at 4 per cent. below the 1939-40 crop, is now calculated as only being 2 per cent. less.

## *Production of Cane-Sugar*

| COUNTRIES | 1940 41 (1) | 1939 40 | Average of 1934 35 to 1938 39 | 1940 41 (1) | 1939 40 | Average of 1934 35 to 1938 39 | % 1940 41 — 1939 40 = 100 | % 1940 41 — Average = 100 |
|---|---|---|---|---|---|---|---|---|
| | 000 centals | | | short tons | | | | |
| **AMERICA** | | | | | | | | |
| Antigua | 540 | 309 | 520 | 27 000 | 15 000 | 25 984 | 175 | 104 |
| Argentina | 11 845 | 11 46[illegible] | 8 804 | 592 218 | 573 455 | 440 171 | 103 | 135 |
| Barbados | 1 764 | 1 587 | 2 718 | 90 000 | 79 000 | 135 905 | 111 | 65 |
| Brazil | 28 506 | 25 923 | 23 231 | 1 425 000 | 1 296 130 | 1 161 530 | 110 | 123 |
| Cuba (2) | 54 520 | 63 163 | 60 266 | 2 726 000 | 3 158 000 | 3 013 269 | 86 | 90 |
| United States (La & F.I.) | 7 077 | 10 392 | 8 528 | 353 854 | 519 597 | 426 400 | 68 | 83 |
| British Guiana | 4 255 | 3 748 | 4 235 | 213 000 | 190 000 | 211 669 | 114 | 101 |
| Jamaica | 3 439 | 2 227 | 2 289 | 172 000 | 111 000 | 114 455 | 154 | 150 |
| Martinique | 1 215 | 1 323 | 1 167 | 61 000 | 70 000 | 58 359 | 92 | 104 |
| Mexico | 6 900 | 6 834 | 6 763 | 345 000 | 340 000 | 338 128 | 101 | 102 |
| Peru | 9 590 | 9 921 | 8 426 | 480 000 | 500 000 | 421 291 | 9[illegible] | 114 |
| Puerto Rico | 18 151 | 20 375 | 17 748 | 907 500 | 1 018 700 | 887 390 | 89 | 102 |
| Dominican Republic (2) | 8 400 | 10 188 | 9 339 | 420 000 | 509 400 | 466 976 | 82 | 90 |
| St Kitts | 851 | 692 | 700 | 42 500 | 34 600 | 34 977 | 123 | 122 |
| Trinidad | 2 734 | 2 065 | 3 086 | 137 000 | 1[illegible] 250 | 154 308 | 132 | 89 |
| Venezuela | 611 | 54[illegible] | 514 | 30 500 | 27 100 | 25 706 | 113 | 119 |
| *Total America* | *160 39[illegible]* | *170 758* | *158 332* | *8 022 572* | *8 545 232* | *7 916 468* | *94* | *101* |
| **ASIA** | | | | | | | | |
| Taiwan | 20 803 | 26 630 | 23 776 | 1 040 100 | 1 331 500 | 1 188 787 | 78 | 87 |
| India | 76 655 | 72 598 | 72 761 | 3 833 000 | 3 630 000 | 3 638 000 | 106 | 105 |
| Japan | 2 399 | 3 386 | 2 751 | 119 900 | 169 300 | 137 560 | 71 | 87 |
| Java | 38 361 | 34 569 | 23 832 | 1 920 000 | 1 728 000 | 1 191 582 | 111 | 161 |
| Philippines (2) | 24 348 | 21 065 | 21 141 | 1 217 400 | 1 053 200 | 1 057 042 | 116 | 115 |
| *Total Asia* | *[illegible]* | *158 248* | *144 761* | *8 130 400* | *7 912 000* | *7 212 966* | *105* | *113* |
| **AFRICA** | | | | | | | | |
| Egypt | 3 924 | 3,5[illegible]4 | 3 213 | 196 000 | 176 198 | 160 668 | 111 | 122 |
| Mauritius | 6 957 | 5 059 | 6 150 | 347 850 | 252 930 | 307 505 | 138 | 113 |
| Reunion | 1 874 | 1 67[illegible] | 1 782 | 94 000 | 81 100 | 89 098 | 116 | 105 |
| Union of South Africa | 11 463 | 11 839 | 10 010 | 570 000 | 59[illegible] 000 | 500 515 | 97 | 115 |
| *Total Africa* | *24 218* | *22 044* | *21 155* | *1 207 850* | *1 102 228* | *1 057 766* | *110* | *114* |
| **OCEANIA** | | | | | | | | |
| Australia | 18 010 | 20 787 | 16 607 | 900 500 | 1 039 400 | 830 341 | 87 | 108 |
| Hawaii | 19,379 | 19 028 | 19 112 | 969 000 | 951 400 | 955 596 | 102 | 101 |
| Fiji Islands | 2 315 | 2 205 | 2 97[illegible] | 116 000 | 100 000 | 148 630 | 105 | 78 |
| *Total Oceania . . .* | *39 704* | *42 020* | *38 692* | *1 985 500* | *2 090 800* | *1 934 567* | *94* | *103* |
| **TOTALS . .** | **386,884** | **393,070** | **362,440** | **19,346,322** | **19,650 260** | **18,121 787** | **98** | **107** |

(1) Approximate data — (2) Willett & Gray estimate

## CURRENT INFORMATION ON SUGAR.

*Belgium* Towards the end of June crop condition was satisfactory but there was still some delay

*Denmark* Crop condition on July 1 was 88, as against 94 at the corresponding date last year

*Hungary:* At the beginning of July the sugar-beet crop was developing very well on the whole.

A production somewhat higher than the average is expected.

*Slovakia:* At the beginning of July, condition of sugar-beet crop was better than average.

*Switzerland:* Sugar beet has developed well, but the soil is often heavy as a result of rain and is liable to dry up rather easily. The condition of the beet crop was indicated at the beginning of July, according to the local method as 75, as against 72 on June 1, 1941 and 80 on July 1, 1940.

*Argentina:* The production of beet-sugar in 1940-41 is estimated at 48,200 centals (2,410 short tons) against 33,100 (1,650) in 1939-40 and an average of 42,050 (2,130) in 1934-35 to 1938-39, percentages, 145.7 and 113.0.

*Canada:* On June 30, 1941 condition of sugar-beet crop was 98 per cent. of the long time (1908-40) average yield per acre, against 95 last year.

*United States:* According to the July report the production of sugar-beets in 1941 is estimated at 191,640,000 centals (9,582,000 short tons) against 243,840,000 (12,192,000) in 1940 and an average of 192,464,000 (9,623,000) in 1935 to 1939; percentages, 78.6 and 99.6.

## CURRENT INFORMATION ON VINES.

*Croatia:* The general condition of vineyards on the Dalmatian coast of Croatia was fairly good at the beginning of July.

On the home market there is a strong demand for wine, even for wine of the next vintage, and this has caused an increase of prices.

*Spain:* At the end of June the situation of the vineyards was good, apart from a few unimportant exceptions, and prospects are now favourable.

*France:* According to press information, production of wine in France is expected to amount this year to about 1,320,000,000 Imperial gallons (1,585,000,000 American gallons).

*Hungary.* At the beginning of July the state of the vineyards was satisfactory. Flowering had finised in the southern parts of the country, while it was still in progress in the North.

The warm weather of the first half of July has favoured vine development.

*Rumania:* At the beginning of July, the vineyards were in good condition but, according to expert opinion, this year's crop will not exceed 75 per cent. of normal production, owing to the mildew attack of last year which damaged the young bearing shoots.

*Switzerland:* The vines are showing in some places the damage which was caused by the severe Winter and by the Spring frosts. Prospects are particularly unfavourable in certain districts, like those bordering the Canton of St. Gall. In Eastern Switzerland the vines made good progress during the second half of June and any delay in development has been, more or less, made good. Condition is generally average, but grapes are well developed. In Western Switzerland the fine weather from June 21 to July 10 had also good effects on the vines. Flowering has been good so far.

Crop condition as on July 1 was indicated, according to the local system by the figure 64, as against 60 on June 1, 1941 and 65 on July 1, 1940.

*Chili:* The total area occupied by vineyards in 1940 is estimated at 252,000 acres, showing a decrease of about 5,400 acres in respect of the year before.

## CURRENT INFORMATIONS ON OLIVES.

*Bulgaria:* According to non official information, the olive crop of the Aegean coastal districts will be this year particularly good. The Ministry of Agriculture have taken all necessary measures to fight the olive fly, whose presence is reported in many places.

*Croatia:* A good olive crop is expected in the Dalmatian districts of Croatia.

*Spain:* The condition of the olive crop at the end of June was good, and a good yield was expected, especially in the provinces of Andalusia and Estremadura.

## CURRENT INFORMATION ON FLAX.

*Belgium:* Some sowings having come out rather badly, a number of plots had to be dug up in certain districts.

*Hungary:* At the end of June the crop of flax for fibre was developing fairly well. In some places it is, however, rather low, irregular, and infested by weeds. Flax for seed had nearly finished flowering and was developing fairly well.

*Rumania:* The wet weather has favoured flax production and, according to reports made in mid July, the flax crop appears very promising. The linseed (grain) crop also looked well during this period.

*Argentina:* Weather condition in June was favourable to the flax crop.

*Canada:* According to the Dominion Bureau of Statistier, the area under flaxseed is 555,000 acre, against 397,400 in 1940 and 308,500 the average of the five years ending 1939; percentages 139.6 and 180.2. Crop condition as of June 30, 1941 was 87 per cent of the long time (1908-40) average yield per acre, against 92 last year.

*United States:* According to the July report the area under linseed this year is 3,228,000 acres against 3,234,000 in 1940 and 1,468,000 on the average of the five years ending 1939, percentages 99.8 and 219.8. The corresponding production is estimated at about 16,810,000 centals (30,018,000 bushels) against 17,482,000 (31,217,000) and 6,181,000 (11,037,000), percentages 96.2 and 272.0.

*India:* According to the second forecast, the area under linseed in 1940-41 is estimated at 2,907,000 acres against 3,026,000 acres in 1939-40, a decrease of about 4 per cent.

## CURRENT INFORMATION ON COTTON.

*Bulgaria:* According to provisional and non official estimates, the area under cotton has reached this year 148,000 acres, as against 123,000 acres last year. With the annexation of Macedonia and Western Thracia the Bulgarian cotton area could reach 247,000 acres, and Bulgaria would thus become the largest cotton producer of Southern Europe.

*Rumania:* Weather conditions have not been suitable for cotton. About mid-July, the appearance of the crop was far from satisfactory.

*U. S. S. R.:* In the collective farms which in 1938 had 95 per cent. of the total cotton area in the country cultivated, the remaining 5 per cent. being grown by the State farms, the area sown by May 15 amounted to 5,000,000 acres, that is, 99.3 per cent. of the area proposed for these farms. At the same date last year, the area sown to cotton in the collective farms was 4,840,000 acres or 98 per cent. of the area planned; by May 31, the entire area was sown, amounting to 4,945,000 acres.

Supposing that this year also the area grown to cotton in the State farms represents about 5 per cent. of the total cotton area, the latter will probably be about 4,945,000 acres and consequently about the same as last year.

During the first half of June, weather conditions, especially in Central Asia, were good

*Argentina:* According to the third forecast, cotton production of the year 1940-41 is estimated to amount at 237,500 bales of 478 lb. net weight, an increase of 10,600 bales from the second forecast issued last May. Production in 1939 40 was 362,500 bales and the average of the preceding five years was 275,300 bales; percentages. 65 5 and 86.3.

*United States.* During the week ending July 25, weather conditions were favourable to the cotton crop in the West, but too rainy in the Central zone and in the South.

The acreage of cotton in cultivation on July 1, 1941, is estimated to be 23,519,000 acres, as against 24,871,000 acres in 1940 and an average of 28,406,000 acres during the 5-year period 1935 to 1939, percentages. 94.6 and 82.5.

## Summary of the Cotton Reports issued by the Government of the United States, during the cotton season (August 1-July 31).

| | Provisional estimates for dates indicated 1940-41 | Final estimates 1939-40 | Final estimates Average 1934-35 to 1938-39 | Percent. 1940-41 1939 40 = 100 | Percent. 1940-41 Aver. = 100 |
|---|---|---|---|---|---|
| *Report referring to July 1:* | | | | | |
| Area in cultivation (acres) | 25,077,000 | 24,683,000 | 29,132,000 | 101.6 | 86 1 |
| *Report referring to August 1.* | | | | | |
| Area left for harvest (acres) | (1) 24,616,000 | (2) 23,805,000 | (2) 28,400,000 | 103.4 | 86 7 |
| Crop condition (per cent. of normal) | 72 | 74 | (3) 71 | — | — |
| Production (4) | 11,429,000 | 11,816,000 | 12,713,000 | 96 7 | 89.9 |
| Yield of lint per acre, in lb. | 222.3 | 237.9 | (3) 198.1 | 93.4 | 112.3 |
| *Cotton ginned to August 1* (5) | 32,187 | 137,254 | 107,222 | 23.5 | 30.0 |
| *Cotton ginned to August 16* (5) | 169,420 | 357,197 | 341.902 | 47.4 | 49.6 |
| *Report referred to 1 September:* | | | | | |
| Area left for harvest (acres) | (6) 24,406,000 | (2) 23,805,000 | (2) 28,400,000 | 102.5 | 85.9 |
| Crop condition (per cent. of normal) | 74 | 70 | (3) 62 | — | — |
| Production 4) | 12,772,000 | 11,816,000 | 12,713,000 | 108.1 | 100.5 |
| Yield of lint per acre, in lb. | 250.7 | 237.9 | (3) 198.1 | 105.4 | 126.6 |
| *Cotton ginned to September 1* (5) | 605,798 | 1,401,691 | 1,424,427 | 43.2 | 42.5 |
| *Cotton ginned to September 16* (5) | 1,805,621 | 3,875,703 | 3,410,335 | 46.6 | 52.9 |

| | Provisional estimates for dates indicated 1940 41 | Final estimates 1939-40 | Final estimates Average 1934 35 to 1938 39 | Percent. 1940-41 1939-40 = 100 | Percent. 1940-41 Aver. = 100 |
|---|---|---|---|---|---|
| *Report referred to October 1:* | | | | | |
| Crop condition (per cent. of normal) . . | 72 | 68 | (3) 63 | — | — |
| Production (4) . . . . . . . . . . . | 12,741,000 | 11,816,000 | 12,713,000 | 107 8 | 100.2 |
| Yield of lint per acre, in lb. . . . . . . | 250 0 | 237.9 | (3) 198 1 | 105 1 | 126.2 |
| *Cotton ginned to October 1* (5) . . . . . . . | 3,924,044 | 6,682,066 | 6,012,716 | 58 7 | 65.3 |
| *Cotton ginned to October 18* (5) . . . . . . | 7,029,593 | 8,874,291 | 8,379,164 | 79 2 | 83.9 |
| *Report referred to November 1:* | | | | | |
| Production (4) . . . . . . . . . . . . . | 12,847,000 | 11,816,000 | 12,713,000 | 108.7 | 101.1 |
| Yield of lint per acre, in lb. . . . . . . | 252 1 | 237.9 | (3) 198 1 | 106.0 | 127.3 |
| *Cotton ginned to November 1* (5) . . . . . . | 9,089 089 | 10,079,112 | 9,765,802 | 90 1 | 93.0 |
| *Cotton ginned to November 14* (5) . . . . . | 10,072 081 | 10,682,457 | 10,705,600 | 94 3 | 94.1 |
| *Report referred to December 1:* | | | | | |
| Area in cultivation, on July 1 (acres) . . | 25,073,000 | 24,683,000 | 29,132,000 | 101 6 | 86.1 |
| Area left for harvest (acres) . . . . | (7) 24,078,000 | (2) 23,805,000 | (2) 28,400,000 | 101 1 | 84.8 |
| Production (4) . . . . . . . . . . . . . | 12,686,000 | 11,816,000 | 12,713,000 | 107.4 | 99.8 |
| Yield of lint per acre, in lb . . . . | 252 4 | 237.9 | (3) 198.1 | 106 1 | 127 4 |
| Average gross weight of running bale, lb (8) | 511 5 | 514 6 | 511.9 | 99 4 | 99 9 |
| *Cotton ginned to December 1* (5) . . . . . . | 10,868,947 | 11,110,486 | 11,455,184 | 97 8 | 94 9 |
| *Cotton ginned to December 13* (5) . . . . | 11,433,304 | 11,276,725 | 11,766,428 | 101.4 | 97.2 |
| *Cotton ginned to January 16* (5) . . . | 11,931,018 | 11,412,432 | 12,155,682 | 104 5 | 98 2 |
| *Report of March 20* | | | | | |
| Total ginnings throughout the season (5) . | 12,287 113 | 11,481,300 | 12,351,808 | 107 0 | 99 2 |
| Equivalent cotton ginned (4) . . . . . | 12 553,005 | 11,815 759 | 12,712,640 | 106 2 | 98 8 |
| Average gross weight of running bale, lb (8) | 510 9 | 514 6 | (3) 511 9 | 99 3 | 99 8 |
| Total number of running bales, excl linters | [illegible] | 11,505,504 | 12,507 657 | 106 2 | 98 3 |
| Including Sea Island . . . . . . . . | 4 866 | 2,192 | 1 884 | 222 0 | 258 3 |
| American-Egyptian . . . . | 32,359 | 26,826 | 16 143 | 120 6 | 200 5 |
| Upland Round bales . . . | 3,471 | 175 189 | 251,609 | 2 0 | 1 4 |
| Upland: Square bales . . . | 12,248,152 | 11,364 687 | 12,237 931 | 107 8 | 100 1 |
| Linters: running bales . . . . . . . . . | . . | 1,073,592 | 1,078,402 | . . . | . |
| Linters equiv 500-pound bales, net weight | . | . . . | 1 291,355 | . . | . . |
| Number of ginneries: total . . . | . | 13,625 | 14,386 | . | |
| Number of ginneries operated . . . | 11,643 | 11,885 | 12,643 | 98 0 | 92.1 |
| Average number of bales ginned per active establishement (5) . . . . . . | 1,055 | 966 | 979 | 109 2 | 107 8 |
| *Report of May 25:* | | | | | |
| Revised estimates of the cotton crop. | | | | | |
| Area in cultivation, on 1 July (acres) . | 24,871,000 | 24,683,000 | 29,132,000 | 100 8 | 85 4 |
| Area picked (acres) . . . . . . . . . . | (9) 23,861,000 | 23,805,000 | 28,400,000 | 100 2 | 84 0 |
| Production (4) . . . . . . . . . . . | 12,565,000 | 11,816,000 | 12,713,000 | 106 3 | 98 8 |
| Yield of lint per acre, in lb. . . . . . | 252.5 | 237 9 | (3) 198 1 | 106 1 | 127 5 |
| Cottonseed produced (sh. tons) . . . | 5,595,000 | 5,260,000 | 5 651,000 | 100 4 | 99 0 |

(1) Area in cultivation on July 1 less the ten-year (1930-39) average abandonment, from natural causes 1.9 per cent. — (2) Area actually harvested — (3) Ten-year (1929-38) average — (4) In bales of 478 lb. net weight and exclusive of linters. — (5) In running bales, counting round bales as half bales and exclusive of linters. — (6) Per cent of the acreage in cotton on July 1, 1940, which has been, or will be, abandoned, from natural causes: 2.6. — (7) Per cent of the acreage in cotton on July 1, 1940, which has been abandoned: 4 0 — (8) Counting round bales as half bales and exclusive of linters. — (9) Abandonment about 4 1 per cent

*Mexico:* Cotton acreage in 1940 is estimated at 617,500 acres, compared with 645,500 acres in 1939 and 664,700 the average of the 5-year period 1934-1938, percentages: 95.7 and 92.9. The corresponding production of ginned cotton amounted to about 288,000 bales of 478 lb. net weight as against 310.010 bales in 1939 and about 303,000 on the average; percentages: 92.9 and 95.1.

*India:* According to the supplementary forecast, area cultivated to cotton in the year 1940-41 was about 22,002,000 acres against 21,356,000 in 1939-40 and 24,802,000 on the average of the five years ending 1938-39; percentages: 107 2 and 92 3. The corresponding production is estimated at about 4,841,000 bales of 478 lb. net weight against 4,136,000 and 4,661,000; percentages 117 1 and 103 9.

## CURRENT INFORMATION ON HEMP.

*Hungary.* At the beginning of July the crops of hemp for fibre and for seed were developing well.

*Rumania* About mid July the hemp crop appeared to be in good condition.

## CURRENT INFORMATION ON TOBACCO.

*Bulgaria* A special decree published in June authorizes tobacco growers in Thracia and Macedonia to plant an acreage equel to that of last year

*Hungary:* At the beginning of July the tobacco crop was developing well, and hoeing was in progress.

*Switzerland:* The condition of the tobacco crop at the beginning of July was indicated, according to the local method, by the index-number 68, the same as on June 1, 1941, as against 75 on July 1, 1940.

*United States* According to the July report the area under tobacco this year is 1,376,000 acres against 1,404,350 in 1940 and 1,640,000 on the average of the five years ending 1939, percentages 98 0 and 83 6 The corresponding production is estimated at about 1,316,181,000 lb against 1,451,066,000 and 1,453,120,000, percentages: 90 7 and 90 6.

*Tunis* The area cultivated to tobacco in 1940 was about 1,200 acres against 1,100 in 1939 and 1,050 on the average of the five years ending 1938; percentages: 112 8 and 115.5. The corresponding production is estimated at about 1,167,000 lb. against 1,035,000 lb , and 1,281,000 lb , percentages: 112 8 and 91.1

## CURRENT INFORMATION ON HOPS.

*Hungary:* At the beginning of July hops had, in part, already flowered, and in part were still flowering. The stems were developing well.

*United States* According to the July report the area under hops this year is nearly 35,000 acres against 32,800 in 1940 and 33,300 on the average of the five years ending 1936; percentages: 106.7 and 105.0. The corresponding production is estimated at about 41,500,000 lb against 41,772,000 and 38,002,000; percentages: 99.3 and 109.2.

## CURRENT INFORMATION ON OTHER PRODUCTS.

### Coffee.

*Brazil:* The policy of destroying superfluous coffee, which had been followed without interruption and with varying intensity, ever since 1931, is now showing, a pause. The stocks at the ports of loading are below normal.

*United States:* The Interamerican Coffee Bureau have decided, by a resolution dated May 28, 1941, to increase by 5 per cent the annual coffee import quotas in respect of the 14 countries participating in the Agreement. The increase for the remaining four months (June 1 to September 30, 1941) is therefore about 1 7 per cent. No increase has been granted to the countries that are not participating in the Agreement The Bureau have also fixed at 15 per cent of the annual quota of each country the excess of shipments which may take place until September 30, 1941, and which may be deducted from the quota for the next year of the Agreement (October 1, 1941 to September 30, 1942).

*Venezuela:* According to the latest official report, the condition of the coffee crop was, in May, from average to good.

### Groundnuts.

*India* According to the final estimate area cultivated to groundnuts in the year 1940 41 was about 8,516,000 acres against 8 410,000 in 1939 40 and 6 850,000 on the average of the five years ending 1938 39, percentages 101.3 and 124 3 The corresponding production is estimated at about 77,800,000 centals (3,800,000 short tons) against 70 900,000 (3,545,000) and 59,230 000 (2,962,000), percentages 109 7 and 131 3.

### Colza, sesame and soya.

*Hungary* At the beginning of July the rape-seed crop appeared in fairly good condition and well developed It was, however, irregular in some places. In certain districts the harvest has began. An average production in expected.

At the end of June the soya bean crop was developing well, and beginning to flower.

*India* According to the second forecast the area under rape and mustard in 1940-41 is estimated at 3,146,000 acres against 2,815,000 acres in 1939-40, an increase of about 12 per cent.

According to the supplementary forecast area cultivated to sesame in the year 1940-41 was about 3,885 000 acres against 4,100,000 in 1939-40 and 4,761,400 on the average of the five years ending 1938-39; percentages 94.8 and 81 6. The corresponding production is estimated at about 9 000,000 centals (450,000 short tons) against 9,300,000 (464,800) and 9.700,000 (485,600), percentages. 96.8 and 92.7.

## CURRENT INFORMATION ON FODDER CROPS.

*Denmark:* The condition of the chief feed crops on July 1, compared with that at the corresponding date last year, was as follows: Mangels 83 (—), Turnips 87 (92), permanent meadows for hay 72 (76), rotation meadows for hay 54 (69), forage 57 (58).

*Finland:* According to the report of the Chamber of Agriculture, the condition of the artificial meadows at the beginning of July was, as expressed in that country, 4.1, as against 4.4 at the similar date last year. The corresponding figures in respect of natural meadows were 3.9 and 4.0.

*Hungary:* At the beginning of July the state of feed crops was as follows:

Mangels were developing well, being favoured by the weather. Their foliage is very good.

The first cut of clover and alfalfa has given satisfactory results from the point of view both of quantity and quality. Also the second cut promises well.

The cut of vesces has also given good results.

Maize for green forage was developing well, but in some places it was invaded by weeds

Millet, buckwheat (this latter is chiefly grown as a secondary crop) and sorghum appeared in good condition.

Hay production from the first cut of permanent meadows has been good.

On the pastures the grass is growing satisfactorily and the cattle is finding an abundant food.

*Rumania:* The second cutting of clover and alfalta was carried out about mid July. The quantity of hay obtained from temporary and permanent grassland is abundant but the quality is not up to standard owing to the wet weather.

*Switzerland:* The first half of June was even more rainy than before As from the middle of the month, however, the weather improved, and it was possible to make hay under excellent conditions. The previous rains had favoured the growth, and therefore the quantity gathered is also satisfactory. The artificial meadows, in particular, have given big yields, while in many places the old natural meadows have not given satisfactory results. The recent storms have favoured the growth of the turf both in natural and artificial meadows. As the turf is quite thick, there is a good possibility, if weather conditions remain favourable, to have a second satisfactory cut. At the present moment, however, the drought seems to hamper the growth to some extent.

The condition of the various feed crops is indicated as follows (basis a good crop made equal to 100):

| | 1 VII 1941 | 1-VI 1941 | 1 VII-1940 |
|---|---|---|---|
| Natural meadows | 76 | 63 | 76 |
| Artificial meadows (clover, alfalfa, etc.) | 81 | 73 | 76 |
| Pastures | 69 | 58 | 78 |
| Mangels | 73 | 70 | 83 |
| Feed carrots | 70 | 72 | 79 |

*Argentina:* The condition of pastures was, in June, less satisfactory than the month before, owing to unfavourable weather conditions.

At the end July weather conditions have been favourable to pastures.

*Canada:* According to the Dominion Bureau of Statistics, condition of the principal fodder crops on June 30, 1941, in percentages of long-time (1908-40) average yields per acre was as follows, with the condition on June 30, 1940 within brackets:

Turnips 87 (93), hay and clover 85 (100) alfalfa 82 (102) fodder corn 87 (87) The corresponding areas with comparisons are as follows

| | 1941 | 1940 | Average 1935-39 | % 1941: 1940 = 100 | % 1941: Average = 100 |
|---|---|---|---|---|---|
| | (1 000 acres) | | | | |
| Turnips | 177 | 186 | 187 | 95 | 94 9 |
| Hay and Clover | 8 804 | 8 811 | 8 766 | 99 9 | 100 4 |
| Alfalfa | 1 005 | 1 032 | 854 | 97 4 | 117 6 |
| Fodder corn | 456 | 466 | 457 | 98 [illegible] | 106 4 |

# LIVESTOCK AND DERIVATIVES

## ANIMALS SLAUGHTERED AND MEAT PRODUCTION IN BELGIUM

| CLASSIFICATION | 1940 | 1939 | 1938 | 1937 | 1936 |
|---|---|---|---|---|---|
| **I — *Animals slaughtered* (number)** | | | | | |
| Steers | 86 623 | 87 658 | 79 245 | 77 787 | 82 032 |
| Bulls | 65 875 | 68 [illegible] | 58 090 | 60 447 | 55 270 |
| Cows | 231 514 | 230 786 | 215 176 | 202 054 | 205 170 |
| Heifers | 145 548 | 154 612 | 150 088 | 147 899 | 145 875 |
| Calves | 278 843 | 371 440 | 356 028 | 372 517 | 379 761 |
| *Total cattle* | *808 403* | *914 247* | *838 6[illegible]5* | *860 704* | *868 009* |
| Sheep | 125 310 | 115 176 | 116 974 | 124 804 | 113 475 |
| Lambs | 8 470 | 12 073 | 10 152 | 12 444 | 15 566 |
| Goats | 2 961 | 6 169 | 9 577 | 13 755 | 16 213 |
| Pigs | 1 275 569 | 1 666 185 | 1 863 515 | 2 078 982 | 1 921 920 |
| Horses | 23 047 | 26 816 | 25 245 | 18 597 | 19 489 |
| **II — *Quantity of meat* (thousand lb)** | | | | | |
| Meat from oxen | 47 743 | 47 054 | 45 392 | 44 186 | 45 393 |
| » » bulls | 33 526 | 37 112 | 34 746 | 32 524 | 30 086 |
| » » cows | 124 392 | 129 565 | 121 069 | 113 617 | 114 298 |
| » » heifers | 70 077 | 75 857 | 73 414 | 72 699 | 68 404 |
| » » calves | 34 383 | 45 222 | 40 856 | 44 340 | 43 994 |
| *Total beef* | *310 121* | *334 810* | *315 477* | *307 366* | *302 175* |
| Mutton | 6 429 | 5 844 | 6 437 | 6 269 | 5 5[illegible]2 |
| Lamb meat | 256 | 387 | 308 | 361 | 435 |
| Goat meat | 96 | 199 | 285 | 376 | 40[illegible] |
| Pork | 218 346 | 311 628 | 344 363 | 381 477 | 357 50[illegible] |
| Horse meat | 16 400 | 19 737 | 17 923 | 13 070 | 12 633 |
| *Total production of meat* | *551 648* | *672 605* | *684 793* | *709 919* | *678 683* |

## LIVESTOCK IN ALBANIA

The number of livestock in Albania at the end of 1939, with the corresponding figures for the five previous years appears from the following table. No statistics are available in respect of 1937.

| CLASSIFICATION | 1939 | 1938 | 1936 | 1935 | 1934 | 1933 |
|---|---|---|---|---|---|---|
| Horses | 100 000 | 54 476 | 67 791 | 67 154 | 68 240 | 66 750 |
| Cattle | 385 000 | 391 175 | 407 205 | 397 763 | 391 400 | 394 767 |
| Buffaloes | 20 000 | 21 486 | 116 453 | 6 991 | 6 730 | 6 546 |
| Sheep | 1 480 000 | 1 573 857 | 1 675 368 | 1 594 965 | 1 540 200 | 1 500 932 |
| Goats | 920 000 | 932 333 | 975 017 | 973 696 | 948 224 | 928 542 |
| Pigs | 14 000 | 15 286 | 24 354 | 24 100 | 23 200 | 23 500 |

## PIGS IN DENMARK.

(Thousands of head)

| CLASSIFICATION | 1941 May 30 | April 19 | March 8 | Jan 5 | 1940 Dec 13 | Nov * [illegible] | Sept 21 | Aug 10 | June 29 | May 4 | March 23 | Febr 10 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Boars for breeding | 11 | 11 | 11 | 11 | 11 | 13 | 14 | 16 | 17 | 17 | 18 | 17 |
| Sows in farrow for first time | 74 | 64 | 45 | 32 | 25 | 22 | 23 | 30 | 50 | 71 | 89 | 89 |
| Other sows in farrow | 87 | 87 | 95 | 100 | 103 | 108 | 120 | 137 | 146 | 151 | 165 | 169 |
| Sows in milk | 47 | 51 | 45 | 44 | 49 | 60 | 64 | 73 | 91 | 101 | 88 | 80 |
| Sows not yet covered (and not for slaughter) | 18 | 15 | 17 | 20 | 23 | 32 | 38 | 41 | 34 | 26 | 24 | 25 |
| Sows for slaughter | 8 | 7 | 11 | 14 | 17 | 23 | 26 | 18 | 15 | 17 | 16 | 12 |
| *Total sows* | *234* | *224* | *211* | *210* | *217* | *245* | *271* | *299* | *336* | *366* | *382* | *375* |
| Sucking pigs not weaned | 390 | 429 | 364 | 350 | 401 | 515 | 539 | 617 | 761 | 807 | 734 | 662 |
| Young and adult pigs for slaughter | | | | | | | | | | | | |
| Weaned pigs under 35 kg | 432 | 409 | 455 | 523 | 607 | 669 | 755 | 850 | 840 | 690 | 712 | 769 |
| Pigs of 35 and under 60 kg | 366 | 419 | 473 | 503 | 516 | 600 | 665 | 690 | 635 | 628 | 686 | 659 |
| Fat pigs of 60 kg and over | 288 | 333 | 359 | 371 | 437 | 486 | 497 | 519 | 629 | 626 | 534 | 558 |
| *Total pigs* | *1 721* | *1,825* | *1 873* | *1 968* | *2 189* | *2 528* | *2,741* | *2 991* | *3 218* | *3 134* | *3 066* | *3 040* |

* Rural districts

## HORSES, CATTLE AND POULTRY IN DENMARK (*)

(Thousand)

| Classification | 19 April 1941 | 29 June 1940 | 16 July 1939 | 16 July 1938 | 17 July 1937 | 15 July 1933 |
|---|---|---|---|---|---|---|
| *Horses* | *540* | *575* | *577* | *565* | *552* | *501* |
| Colts under 1 year | 30 | 53 | 53 | 50 | 50 | 25 |
| Colts from 1 to 3 years | 84 | 93 | 92 | 88 | 79 | 40 |
| Stallions 3 years old and over | 4 | 4 | 4 | 4 | 4 | 3 |
| Geldings 3 years old and over | 197 | 200 | 203 | 202 | 201 | 207 |
| Mares 3 years old and over | 225 | 225 | 225 | 220 | 218 | 226 |
| *Cattle* | *3 068* | *3 226* | *3 271* | *3 186* | *3 084* | *3,134* |
| Calves under 1 year old | 778 | 862 | 852 | 834 | 764 | 685 |
| Bulls 1 year old and over | 67 | 64 | 68 | 63 | 64 | 78 |
| Steers | 78 | 74 | 78 | 80 | 80 | 59 |
| Heifers 1 year old and over | 644 | 635 | 659 | 610 | 603 | 542 |
| Cows and heifers having farrowed | 1 506 | 1,591 | 1,614 | 1 599 | 1 574 | 1,770 |
| *Fowls* | *8 352* | *21 865* | *32 398* | *27 864* | *26,498* | *25 550* |
| Chicken under 6 months | 347 | 9,673 | 18 680 | 15,732 | 13,052 | 13 463 |
| Cocks 6 months old and over | 160 | 127 | 188 | 174 | 194 | 314 |
| Hens 6 months old and over | 7 845 | 12 065 | 13,530 | 11 958 | 13 252 | 11 773 |

(*) Rural districts

## LIVESTOCK IN SPAIN (see also the Bulletin of the previous month)

Estimate on July 1, 1939 compared with the result of the May 30, 1933 and May 30, 1929 Census

| Classification | July 1, 1939 | May, 30 1933 | May 30 1929 |
|---|---|---|---|
| Sheep | 21 778 800 | 19 093 319 | 19 370 443 |
| Goats | 6 691 800 | 4 574 860 | 4 524 954 |
| Pigs | 6 942 300 | 5 411 535 | 4 773 366 |

## WOOL PRODUCTION IN AUSTRALIA

Wool production (greasy basis, wool clip plus skin wool) in Australia in the year ending June 30, 1941 is provisionally forecast at 1,090 million lb., compared with 1,128 million lb. (revised estimate) last year and 995 million lb. the average for the five preceding years, percentages 96.6 and 109.5.

## CURRENT INFORMATION ON LIVESTOCK AND DERIVATIVES.

*Sweden:* The Swedish Butchers' Association states that, according to press information, during the first quarter of 1941, about 10 per cent more cattle were slaughtered than during the corresponding quarter last year, this owing to scarcity of fodder due to the drought. During April and May, on the other hand, slaughterings decreased by about 22 per cent by comparison with the first quarter, as cattle could be sent to the pastures in large number Pig slaughterings has also shown, during recent weeks, a reduction of about 28 per cent. by comparison with the corresponding period last year.

According to the last Agricultural Association Report, production of butter in May 1941 was 15,529 thousand of lb. against only 15,215 thousand of lb during May 1940. Production of cheese was, on the contrary, in decrease with 4,801 thousand of lb. against 7,430 thousand of lb in May 1940.

*Argentina:* At the end July the sanitary condition of livestock is good

## CURRENT INFORMATION ON SERICULTURE.

*Japon:* According to recent information, a decrease of 20 per cent is expected in the incubation of seed for the Spring season.

# TRADE

## Wheat.

| Countries | May Exports 1941 (Thousand centals, 1 cental = 100 lb) | May Exports 1940 | May Imports 1941 | May Imports 1940 | Ten months (August 1 – May 31) Exports 1940-41 | Exports 1939-40 | Imports 1940-41 | Imports 1939-40 | May Exports 1941 (Thousand bushels of 60 lb) | May Exports 1940 | May Imports 1941 | May Imports 1940 | Ten months (August 1 – May 31) Exports 1940-41 | Exports 1939-40 | Imports 1940-41 | Imports 1939-40 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Portugal | 0 | 0 | 0 | 33 | 0 | 0 | 1 986 | 431 | | 0 | 0 | 55 | 0 | 0 | 3 311 | 718 |
| Romania | 0 | 598 | 0 | 0 | 18 | 17 707 | 0 | 0 | 0 | 329 | 0 | 0 | 30 | 29 511 | 0 | 0 |
| United States | 348 | 156 | 1 411 | 531 | 5 29[illegible] | 11 991 | 5 334 | 5 034 | 1 414 | 2[illegible] | 2 401 | 885 | 8 8[illegible]4 | 19 985 | 8 890 | 8,390 |
| Argentina | 6 856 | 11 [illegible]4 | — | — | 45 651 | 86 938 | — | — | 11 393 | 17 [illegible]74 | — | — | 76 084 | 144 89[illegible] | — | — |
| Peru | | | | | [1]) 0 | 0 | [1]) 1 438 | [1]) 1 823 | | | | | [1]) 0 | [1]) 0 | [1]) 2 397 | [1]) 3,038 |
| Turkey | 0 | 73 | — | — | 57 | 1 051 | — | — | 0 | [1]) 1 220 | — | — | 95 | 1 752 | — | — |

## Wheat Flour.

| Countries | May Exports 1941 (Thousand centals, 1 cental = 100 lb) | May Exports 1940 | May Imports 1941 | May Imports 1940 | Ten months Exports 1940-41 | Exports 1939-40 | Imports 1940-41 | Imports 1939-40 | May Exports 1941 (Thousand barrels of 196 lb) | May Exports 1940 | May Imports 1941 | May Imports 1940 | Ten months Exports 1940-41 | Exports 1939-40 | Imports 1940-41 | Imports 1939-40 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Portugal | 1 | 0 | 1 | 0 | 0 | 0 | 16 | 12 | 0 | 0 | 1 | 0 | 0 | 0 | 8 | 6 |
| Romania | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| United States | 1 317 | 839 | 0 | 12 | 10 611 | 10 [illegible]0 | 114 | 106 | 67[illegible] | 428 | 0 | 6 | 5 414 | 5 358 | 58 | 54 |
| Argentina | [illegible] | 104 | — | — | 906 | 1 73[illegible] | — | | 36 | 53 | — | | 462 | 884 | — | — |
| Peru | | | | | [1]) 0 | [1]) 0 | [1]) 21 | [1]) 26 | | | | | [1]) 0 | [1]) 0 | [1]) 10 | [1]) 13 |
| Turkey | | [illegible] | — | — | 1 | 1 | — | — | 0 | 0 | — | — | 0 | 1 | — | — |

## Total Wheat and Flour (†).

| Countries | May Net Exports (*) 1941 (Thousand centals, 1 cental = 100 lb) | May Net Exports (*) 1940 | May Net Imports (**) 1941 | May Net Imports (**) 1940 | Ten months Net Exports (*) 1940-41 | Net Exports (*) 1939-40 | Net Imports (**) 1940-41 | Net Imports (**) 1939-40 | May Net Exports (*) 1941 (Thousand bushels of 60 lb) | May Net Exports (*) 1940 | May Net Imports (**) 1941 | May Net Imports (**) 1940 | Ten months Net Exports (*) 1940-41 | Net Exports (*) 1939-40 | Net Imports (**) 1940-41 | Net Imports (**) 1939-40 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Portugal | — | — | — | 33 | — | | 2 008 | 447 | — | — | 3 | 55 | — | — | 3 347 | 744 |
| Romania | 5 | 1 398 | — | | 18 | 17 708 | — | — | 0 | 2 329 | — | — | 30 | 29 513 | — | — |
| United States | 1 164 | 708 | — | — | 13 957 | 20 819 | — | — | 1 939 | 1 180 | — | — | 23 261 | 34 697 | — | — |
| Argentina | 6 930 | 10 683 | — | — | 46 860 | 89 748 | — | — | 11 550 | 17 805 | — | — | 78 099 | 148 743 | — | — |
| Peru | — | — | | | | — | [1]) 1 463 | [1]) 1 857 | — | — | | | — | — | [1]) 2 442 | [1]) 3 095 |
| Turkey | 1 | 732 | — | — | 58 | 1 053 | — | — | 2 | 1 220 | — | — | 96 | 1 754 | — | — |

## Rye.

| Countries | May Exports 1941 (Thousand centals, 1 cental = 100 lb) | May Exports 1940 | May Imports 1941 | May Imports 1940 | Ten months Exports 1940-41 | Exports 1939-40 | Imports 1940-41 | Imports 1939-40 | May Exports 1941 (Thousand bushels of 56 lb) | May Exports 1940 | May Imports 1941 | May Imports 1940 | Ten months Exports 1940-41 | Exports 1939-40 | Imports 1940-41 | Imports 1939-40 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Romania | 0 | 432 | 0 | 0 | 24 | 1 954 | 0 | 0 | 0 | 771 | 0 | 0 | 43 | 3 490 | 0 | 0 |
| United States | 0 | 63 | 254 | 0 | 136 | 408 | 651 | 0 | 0 | 113 | 454 | 0 | 244 | 728 | 1 162 | 0 |
| Argentina | 72 | 461 | — | — | 893 | 5 468 | | — | 129 | 824 | — | — | 1 594 | 9 800 | — | — |
| Turkey | 0 | 55 | — | — | 22 | 195 | — | — | 0 | 99 | — | — | 40 | 348 | — | — |

## Barley.

| Countries | May Exports 1941 (Thousand centals, 1 cental = 100 lb) | May Exports 1940 | May Imports 1941 | May Imports 1940 | Ten months Exports 1940-41 | Exports 1939-40 | Imports 1940-41 | Imports 1939-40 | May Exports 1941 (Thousand bushels of 48 lb) | May Exports 1940 | May Imports 1941 | May Imports 1940 | Ten months Exports 1940-41 | Exports 1939-40 | Imports 1940-41 | Imports 1939-40 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Romania | 0 | 0 | 1 | 0 | 1,138 | 2 607 | 1 | 0 | 0 | 0 | 3 | 0 | 2 370 | 5 430 | 3 | 0 |
| United States | 32 | 19 | 27 | 16 | 219 | 1 655 | 563 | 173 | 66 | 40 | 56 | 33 | 457 | 3 448 | 1,174 | 361 |
| Argentina | 9 | 248 | — | — | 1 954 | 8 649 | — | — | 19 | 517 | — | — | 4 072 | 18 019 | — | — |
| Turkey | 0 | 98 | — | — | 340 | 998 | — | — | 0 | 204 | — | — | 708 | 2 080 | — | — |

(*) Excess of exports over imports — (**) Excess of imports over exports.
(†) Flour reduced to grain on the basis of the coefficient 1,000 centals of flour = 1,333 333 centals of grain (Thousand barrels flour = 4,355 55 bushels of grain).
[1]) Up to the end of February.

| Countries | May: Exports 1941 | May: Exports 1940 | May: Imports 1941 | May: Imports 1940 | Ten months (August 1-May 31): Exports 1940-41 | Exports 1939-40 | Imports 1940-41 | Imports 1939-40 | May: Exports 1941 | May: Exports 1940 | May: Imports 1941 | May: Imports 1940 | Ten months (August 1-May 31.): Exports 1940-41 | Exports 1939-40 | Imports 1940-41 | Imports 1939-40 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Oats.** | | | | | | | | | | | | | | | | |
| | Thousand centals (1 cental = 100 lb.) | | | | | | | | Thousand bushels of 32 lb. | | | | | | | |
| Romania | 0 | 0 | 0 | 0 | 199 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 621 | 0 | 0 | 0 |
| United States | 2 | 3 | 371 | 753 | 43 | 58 | 2,705 | 2,727 | 7 | 10 | 1,160 | 2,353 | 134 | 183 | 8,453 | 8,522 |
| Argentina | 26 | 402 | ... | ... | 1,175 | 8,137 | 1) 7 | 1) 6 | 82 | 1,256 | ... | ... | 3,671 | 25,427 | 1) 21 | 1) 19 |
| Peru | — | — | ... | ... | — | — | 2) 31 | 2) 13 | — | — | ... | ... | — | — | 2) 97 | 2) 42 |
| Turkey | 0 | 0 | — | — | 0 | 6 | — | — | 0 | 0 | — | — | 0 | 18 | — | — |
| **Maize.** | | | | | | | | | | | | | | | | |
| | Thousand centals (1 cental = 100 lb.). | | | | Seven months (November 1-May 31.) | | | | Thousand bushels of 56 lb. | | | | Seven months (November 1-May 31.) | | | |
| Portugal | 0 | 0 | 256 | 30 | 0 | 0 | 843 | 180 | 0 | 0 | 457 | 53 | 0 | 0 | 1,505 | 322 |
| Romania | 565 | 1,950 | 0 | 0 | 2,734 | 8,526 | 0 | 0 | 1,008 | 3,483 | 0 | 0 | 4,881 | 15,224 | 0 | 0 |
| United States | 556 | 692 | 30 | 45 | 1,934 | 12,302 | 431 | 205 | 993 | 1,236 | 54 | 80 | 3,453 | 21,967 | 769 | 367 |
| Dominican R. | ... | ... | — | — | 3) 62 | 3) 47 | — | — | ... | ... | — | — | 3) 110 | 3) 83 | — | — |
| Argentina | 35 | 6,224 | — | — | 8,764 | 34,659 | — | — | 63 | 11,114 | — | — | 15,650 | 61,891 | — | — |
| Peru | ... | ... | ... | ... | 2) 0 | 2) 0 | 2) 0 | 2) 0 | ... | ... | ... | ... | 2) 0 | 2) 0 | 2) 0 | 2) 0 |
| **Rice.** | | | | | | | | | | | | | | | | |
| | Thousand centals (1 cental = 100 lb.). | | | | Five months (January 1-May 31) | | | | Thousand bushels of 45 lb. | | | | Five months (January 1-May 31.) | | | |
| | | | | | 1941 | 1940 | 1941 | 1940 | | | | | 1941 | 1940 | 1941 | 1940 |
| Portugal | 0 | 0 | 3 | 6 | 0 | 1 | 4 | 13 | 0 | 1 | 7 | 13 | 0 | 2 | 9 | 29 |
| Romania | — | — | 0 | 33 | — | — | 23 | 187 | — | — | 0 | 74 | — | — | 51 | 416 |
| United States | 387 | 289 | 23 | 60 | 2,017 | 1,444 | 66 | 173 | 861 | 643 | 51 | 133 | 4,482 | 3,209 | 146 | 385 |
| Argentina | 0 | 0 | ... | ... | 6 | 1 | 1) 41 | 1) 18 | 0 | 1 | ... | ... | 14 | 2 | 1) 92 | 1) 41 |
| Peru | ... | ... | ... | ... | 2) 0 | 2) 0 | 2) 67 | 2) 108 | ... | ... | ... | ... | 2) 0 | 2) 0 | 2) 148 | 2) 241 |
| **Linseed.** | | | | | | | | | | | | | | | | |
| | Thousand centals (1 cental = 100 lb.). | | | | | | | | Thousand bushels of 56 lb. | | | | | | | |
| Portugal | — | — | 0 | 0 | — | — | 11 | 41 | — | — | 0 | 0 | — | — | 19 | 72 |
| Romania | 0 | 0 | 0 | 3 | 0 | 0 | 5 | 7 | 0 | 0 | 0 | 6 | 0 | 0 | 9 | 12 |
| United States | — | — | 659 | 803 | — | — | 3,614 | 4,159 | — | — | 1,177 | 1,434 | — | — | 6,454 | 7,426 |
| Argentina | 1,281 | 1,511 | ... | ... | 4,025 | 12,894 | 1) 0 | 1) 0 | 2,287 | 2,699 | ... | ... | 7,188 | 23,024 | 1) 0 | 1) 0 |
| **Cotton.** | | | | | | | | | | | | | | | | |
| | Thousand centals (1 cental = 100 lb.). | | | | Ten months (August 1-May 31.) | | | | Thousand bales of 478 lb. | | | | Ten months (August 1-May 31.) | | | |
| | | | | | 1940-41 | 1939-40 | 1940-41 | 1939-40 | | | | | 1940-41 | 1939-40 | 1940-41 | 1939- |
| Portugal | — | — | 76 | 48 | — | — | 372 | 511 | — | — | 16 | 10 | — | — | 78 | 1 |
| Romania | 0 | 0 | 11 | 35 | 0 | 0 | 129 | 298 | 0 | 0 | 2 | 7 | 0 | 0 | 27 | |
| United States | 387 | 1,192 | 154 | 71 | 5,162 | 31,220 | 749 | 687 | 81 | 249 | 32 | 15 | 1,080 | 6,631 | 157 | 1 |
| Argentina | 202 | 45 | ... | ... | 425 | 409 | 1) 6 | 1) 4 | 42 | 9 | ... | ... | 89 | 86 | 1) 1 | 1) |
| Peru | ... | ... | — | — | 2) 724 | 2) 1,139 | — | — | ... | ... | — | — | 2) 152 | 2) 238 | — | — |
| Turkey | 0 | 25 | — | — | 233 | 118 | — | — | 0 | 5 | — | — | 49 | 25 | — | — |

1) Up to March 31. — 2) Up to the end of February. — 3) Up to December 31.

Thousand lb.

| COUNTRIES | May: Exports 1941 | May: Exports 1940 | May: Imports 1941 | May: Imports 1940 | Nine months (September 1 May 31): Exports 1940-41 | Exports 1939-40 | Imports 1940-41 | Imports 1939-40 | May: Exports 1941 | May: Exports 1940 | May: Imports 1941 | May: Imports 1940 | Five months (January 1 May 31): Exports 1941 | Exports 1940 | Imports 1941 | Imports 1940 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Wool.** | | | | | | | | **Butter.** | | | | | | | |
| Portugal | 0 | 0 | 26 | 93 | 0 | 2,035 | 181 | 1 570 | 62 | 7 | 0 | 0 | 137 | 46 | 0 | 0 |
| Rumania | 0 | 0 | 130 | 161 | 0 | 0 | 7 932 | 302 | 0 | 2 | 0 | 0 | 0 | 238 | 0 | 0 |
| United States | 0 | 2 | 74 955 | 18 466 | 4 | 115 | 531 622 | 260 018 | 132 | 174 | 344 | 130 | 1 052 | 1,025 | 853 | 551 |
| Argentina (a) | 36 954 | 13 741 | — | — | 261 628 | 178 191 | — | — | 1 647 | 355 | — | — | 22 869 | 9 998 | — | — |
| Argentina (b) | 9 348 | 4 863 | — | — | 65 740 | 59 626 | — | — | | | | | | | | |
| Peru | | | — | — | [2]) 5 792 | [1]) 7 509 | — | | | | | | [2]) 0 | [2]) 0 | [2]) 46 | [2]) 31 |
| Turkey | 0 | 2 | — | — | 6 854 | 5 474 | — | | — | — | — | — | — | — | — | — |
| | **Cheese.** | | | | Five months (January 1 May 31): 1941 | 1940 | 1941 | 1940 | **Cacao.** | | | | Eight months (October 1 May 31): 1940-41 | 1939-40 | 1940-41 | 1939-40 |
| Portugal | 37 | 31 | 4 | 9 | 139 | 119 | 11 | 26 | 0 | 13 | 225 | 117 | 0 | 26 | 1 526 | 999 |
| Rumania | 0 | 49 | 0 | 0 | 0 | 137 | 9 | 15 | — | — | 0 | 540 | — | — | 22 | 2 015 |
| United States | | | 114 | 4 072 | [1]) 933 | 613 | 9 742 | 18 140 | — | — | 80 703 | 45 067 | — | — | 586 085 | 388 310 |
| Dominican Rep. | | | — | — | | | — | | | | — | | [1]) 5 855 | [4]) 5 858 | — | — |
| Argentina | 2 271 | 701 | | | 11 034 | 2 167 | [4]) 0 | 7 | — | — | | | — | — | [4]) 6 554 | [4]) 5,313 |
| Peru | | | | | [1]) 0 | [1]) 0 | [1]) 77 | 77 | — | — | | | — | — | [2]) 373 | [2]) 128 |
| | **Tea.** | | | | Eleven months (July 1 May 31): 1940-41 | 1939-40 | 1940-41 | 1939-40 | **Coffee.** | | | | Eleven months (July 1 May 31) | | | |
| Portugal | | | 68 | 37 | — | — | 401 | 324 | 23 | 98 | 1 490 | 1 532 | 3 058 | 3 276 | 14 817 | 16 870 |
| Rumania | — | — | 0 | 178 | | — | 161 | 734 | — | — | 0 | 494 | — | — | 2 538 | 5 273 |
| United States | — | — | 11 191 | 4 921 | — | — | 91 935 | 95 564 | 1 014 | 928 | 228 558 | 156 807 | 10 289 | 11 347 | 2365725 | 1881821 |
| Dominican Rep. | — | — | — | — | — | | | — | | | — | — | [4]) 7 727 | [4]) 8 353 | — | — |
| Argentina | — | — | | | — | — | [1]) 2 359 | 3 399 | | — | | | — | — | 44 258 | [2]) 43 098 |
| Brazil | — | — | | | — | — | — | | 150 929 | 166 339 | — | — | 1596209 | 1899022 | — | — |
| Colombia | | | — | — | | — | | | 48 883 | 40 210 | — | — | 536 600 | 448 677 | — | — |
| Peru | | | | | | | [3]) 1 105 | 816 | | | — | — | [2]) 3 325 | [2]) 5 399 | — | — |
| Venezuela | | | | | — | | — | | | | | — | [1]) 89 217 | [1]) 37 761 | — | |
| Turkey | | | 174 | 306 | — | — | 1 570 | 1 336 | — | — | 258 | 295 | — | | 4 387 | 12 245 |

(a) Unwashed wool — (b) Washed wool

[1]) Up to April 30 [2]) Up to March 31 — [3]) Up to the end of February [4]) Up to December 31

# STOCKS

## Stocks of cereals in farmers' hands in the United States.

| Products | Percentage of total production | | | | Thousand centals | | | | Thousand bushels | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July 1941 | April 1941 | July 1940 | July 1939 | July 1941 | April 1941 | July 1940 | July 1939 | July 1941 | April 1941 | July 1940 | July 1939 |
| Wheat | 10.9 | 24.0 | 11.1 | 9.7 | 53 458 | 117 453 | 49 888 | 54 223 | 89 097 | 195 755 | 83 146 | 90 372 |
| Oats | 17.7 | 38.0 | 15.5 | 17.5 | [illegible] | 150 572 | 45 916 | 60 068 | 218 817 | 469 913 | 143 488 | 187 715 |
| Maize (1) | 30.3 | 46 | 6 | 36.9 | 41 371 | 660 844 | 477 805 | 475 868 | 741 734 | 1 180 078 | 853 [illegible] | 849 765 |

(1) Data based on maize for grain.

## Commercial cereals in store in Canada and the United States

| Products and location | Friday or Saturday nearest 1st of month (1) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | July 1941 | June 1941 | May 1941 | July 1940 | July 1939 | July 1941 | June 1941 | May 1941 | July 1940 | July 1939 |
| | thousand centals | | | | | thousand bushels | | | | |
| **Wheat** | | | | | | | | | | |
| Canadian in Canada | | 56 940 | 262 930 | 154 279 | 58 874 | | 428 235 | 438 [illegible]17 | 7 131 | 98 123 |
| U. S. in Canada | | 137 | 137 | 383 | 347 | | 2[illegible]8 | 228 | 639 | 578 |
| U. S. in the United States | 91 138 | 83 708 | 83 471 | 52 395 | 48 800 | 151 896 | 139 513 | 139 119 | 87 325 | 81 334 |
| Canadian in the United States | 20 576 | 20 044 | 17 975 | 13 064 | 2 804 | 34 210 | 34 406 | 29 954 | 1 773 | 4 675 |
| Total | | 361 4[illegible] | 364 513 | 270 121 | 110 825 | | 602 38[illegible] | 607 523 | 366 868 | 184 708 |
| **Rye** | | | | | | | | | | |
| Canadian in Canada | | 1 347 | 1 594 | 1 042 | 1 413 | | 2 405 | 2 847 | 1 861 | 2 523 |
| U. S. in Canada | | 15 | 13 | 13 | 13 | | 24 | 24 | 24 | 24 |
| U. S. in the United States | 3 158 | 3 072 | 2 773 | 5 323 | 4 135 | 5 639 | 5 486 | 4 951 | 9 506 | 7 381 |
| Canadian in the United States | 2 329 | 1 898 | 1 496 | 1 562 | 116 | 4 159 | 3 390 | 2 672 | 2 789 | 207 |
| Total | | 6 330 | 5 876 | 7 940 | 5 677 | | 11 305 | 10 491 | 14 180 | 10 138 |
| **Barley** | | | | | | | | | | |
| Canadian in Canada | | 2 256 | 2 540 | 2 933 | 3 056 | | 4 700 | 5 291 | 6 111 | 6,324 |
| U. S. in Canada | | 5 | 0 | 2 | 5 | | 10 | 0 | 4 | 10 |
| U. S. in the United States | 2 367 | 2 268 | 2 47[illegible] | 3 339 | 2 981 | 4 931 | 4 726 | 5 157 | 6 956 | 6 210 |
| Canadian in the United States | 40 | 5 | 55 | 587 | 29 | 84 | 10 | 114 | 1 272 | 61 |
| Total | | 4 534 | 5 070 | 6 861 | 6 051 | | 9 446 | 10 562 | 14 293 | 12 605 |
| **Oats** | | | | | | | | | | |
| Canadian in Canada | | 1 496 | 2 019 | 2 160 | 3 007 | | 4 675 | 6 308 | 6 749 | 9 398 |
| U. S. in Canada | | 46 | 0 | 21 | 60 | | 143 | 0 | 65 | 188 |
| U. S. in the United States | 1 250 | 1 463 | 1 431 | 1 002 | 1 822 | 3 906 | 4 571 | 4 473 | 3 130 | 5 695 |
| Canadian in the United States | 165 | 116 | 67 | 83 | 32 | 517 | 361 | 209 | 258 | 100 |
| Total | | 3 121 | 3 517 | 3 266 | 4 921 | | 9 750 | 10,990 | 10 202 | 15,381 |
| **Maize** | | | | | | | | | | |
| U. S. in Canada | | 567 | 244 | 935 | 1 963 | | 1 012 | 436 | 1 669 | 3,506 |
| Argentine in Canada | | | | | 12 | | | | | 2 |
| South African in Canada | | | | | 191 | | | | | 341 |
| Australian in Canada | | | | | 29 | | | | | 51 |
| U. S. in the United States | 29 737 | 34 137 | 36 659 | 14 235 | 17 293 | 53,102 | 60 959 | 65 463 | 25,419 | 30 880 |
| Total | | | | | 19 488 | | | | | 34 800 |

(1) Friday for Canada, Saturday for the United States

## Commercial cereals and oilseeds in store in Argentina.

| Products and location | | First day of month | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | July 1941 (1) | June 1941 (1) | May 1941 (1) | July 1940 | July 1939 | July 1941 (1) | June 1941 (1) | May 1941 (1) | July 1940 | July 1939 |
| | | thousand centals | | | | | thousand bushels | | | | |
| Wheat in the ports | | 37 295 | 31 784 | 24 236 | 19 685 | (2) | 62 162 | 52 973 | 40 391 | 32 807 | (2) |
| Wheat in other positions | | 63 156 | 74 687 | 85 292 | 22 991 | (2) | 105 258 | 124 475 | 142 151 | 38 318 | (2) |
| | Total | *100 454* | *106 471* | *109 528* | *42 676* | | *167 420* | *177 448* | *182 542* | *71 125* | (2) |
| Rye | | 3 715 | 3 855 | 3 932 | 4 552 | 1 547 | 6 634 | 6 885 | 7 021 | 8 129 | 2 763 |
| Barley | | 14 665 | 14 378 | 14 080 | 4 814 | 1 840 | 30 553 | 29 954 | 29 334 | 10 030 | 3,833 |
| Oats | | 2 304 | 2 429 | 497 | 415 | 3 600 | 7 199 | 7 592 | 7 805 | 10 672 | 11,251 |
| Maize in the ports | | 2 037 | 2 194 | 2 225 | 4 398 | 3 470 | 3 638 | 3 917 | 3 975 | 7 854 | 6 196 |
| Maize in other positions | | 1 980 | 2 026 | 1 780 | 6 982 | 5 576 | 3 535 | 3 618 | 3 179 | 12 468 | 9,957 |
| | Total | *4 017* | *4 220* | *4 005* | *11 380* | *9 046* | *7 173* | *7 535* | *7 15[illegible]* | *20 322* | *16,153* |
| Canaryseed | | 498 | 485 | 498 | 52[illegible] | 315 | 890 | 866 | 890 | 931 | 559 |
| Linseed in the ports | | 9 760 | 7 681 | 4 871 | 3 445 | 4 209 | 17 428 | 13 717 | 8 698 | 6 152 | 7,517 |
| Linseed in other positions | | 18 003 | 19 755 | 1[illegible]951 | 2 809 | 3 233 | 32 148 | 35 276 | 39 163 | 5 016 | 5,773 |
| | Total | *27 763* | *27 436* | *26 80[illegible]* | *6 254* | *7 442* | *49 576* | *48 993* | *47 861* | *11 168* | *13,290* |
| Sunflowerseed | | 4 539 | 2 989 | 1 511 | 2 [illegible]1 | 1 138 | 10 424 | 10 673 | 5 394 | 7 899 | 4 064 |

(1) In the data for July stocks the property of the Junta Reguladora de Granos in the hands of merchants or industrialists are included for wheat, rye, linseed and sunflower seed. In the data for June and May the same stocks are included for wheat, rye and linseed. — (2) Figure for wheat in store has been withheld by government order.

## Cotton stocks on hand in the United States.

| Location | Last day of month | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | June 1941 | May 1941 | April 1941 | June 1940 | June 1939 | June 1941 | May 1941 | April 1941 | June 1940 | June 1939 |
| | thousand centals | | | | | thousand running bales (counting round as half bales) | | | | |
| In consuming establishments | 9 426 | 9 476 | 9 505 | 5 699 | 5 013 | 1 918 | 1 928 | 1 934 | 1 160 | 1,020 |
| In public storage and at compresses | 51,998 | 55,876 | 60,880 | 47 090 | 58 760 | 10 570 | 11 358 | 12 375 | 9 572 | 11,949 |
| Total | *61,424* | *65 352* | *70 385* | *52 789* | *63 773* | *12 488* | *13 286* | *14 309* | *10 732* | *12,969* |

# PRICES BY PRODUCTS.

## A) — Spot quotations. [1]

| Description | July 11 1941 | July 3 1941 | June 27 1941 | June 20, 1941 | Monthly averages: June 1941 | Monthly averages: July 1940 | Monthly averages: July 1939 | Yearly averages: 1939-40 [2] | Yearly averages: 1938-39 [2] |
|---|---|---|---|---|---|---|---|---|---|
| **Wheat** | | | | | | | | | |
| Chicago No 2 Hard Winter (cents p 60 lb) | 104 1/2 | 105 1/4 | 107 | 101 1/2 | 102 3/4 | 76 3/8 | 68 5/8 | 92 7/8 | 70 3/4 |
| Minneapolis (cents per 60 lb) | | | | | | | | | |
| No 1 Northern | 101 3/8 | 99 3/8 | 99 7/8 | 99 7/8 | 99 5/8 | 77 1/8 | 73 3/8 | 91 1/8 | 74 5/8 |
| No 2 Amber Durum | 94 1/8 | 90 7/8 | 91 1/8 | 91 1/8 | 91 3/4 | 68 3/4 | 69 3/4 | 80 3/4 | 68 3/8 |
| New York (cents p 60 lb) | | | | | | | | | |
| Manitoba Northern No 1 (c i f) | 92 | 88 3/4 | 93 3/4 | 93 3/4 | 93 3/4 | 82 7/8 | 63 3/4 | 92 1/4 | 73 5/8 |
| Hard Winter No 2 (f o b) | 127 1/2 | 126 5/8 | 128 7/8 | 122 7/8 | 123 3/4 | 94 1/4 | 87 3/4 | 112 1/4 | 84 3/4 |
| Buenos Aires (a) No 2 Hard, 78 kg per hl (paper pesos p 100 kg) | 7.00 | 6.85 | 6.85 | 6.80 | 6.81 | 9.19 | 7.00 | 7.66 | 6.8[illegible] |
| **Rye** | | | | | | | | | |
| Minneapolis No 2 rye (cents p 56 lb) | 56 1/2 | 55 [illegible]/8 | 55 7/8 | 57 1/4 | 57 3/8 | 44 1/4 | 42 3/4 | 56 1/8 | 44 |
| New York No 2 (c i f cents p 48 lb) | 72 3/4 | 71 3/8 | 73 | 68 1/4 | 68 1/2 | 62 [illegible]/8 | 61 3/4 | 77 [illegible]/8 | 59 1/4 |
| **Barley** | | | | | | | | | |
| Chicago Feeding (on sample cents p 48 lb) | 48 | 48 | 48 | 47 | 49 3/4 | 39 1/4 | 38 5/8 | 42 1/4 | 40 [illegible] |
| Minneapolis N Feeding (cents p 48 lb) | n q | n q | n q | n q | n q | 42 1/[illegible] | 57 1/2 | 45 | 40 7/8 |
| New York No 2 (cents p 48 lb) | 66 | 65 1/2 | 66 | 67 1/[illegible] | 68 1/4 | 57 1/4 | 52 3/4 | 62 5/8 | 56 1/8 |
| **Oats** | | | | | | | | | |
| Chicago No 2 White (cents per 32 lb) | 38 1/4 | 39 1/2 | 39 1/4 | 36 3/4 | 37 3/4 | 33 [illegible]/8 | 30 1/8 | 39 | 30 [illegible]/8 |
| Buenos Aires (a) No 2 White 49 kg p hl (paper pesos per 100 kg) | 4.50 | 4.50 | 4.40 | 4.30 | 4.32 | n q | 4.12 | * 5.17 | 4.81 |
| **Maize.** | | | | | | | | | |
| Chicago No 3 Yellow (cents p 56 lb) | 74 1/4 | 73 3/4 | 75 1/4 | 74 1/4 | 74 1/8 | 64 [illegible]/8 | 44 5/8 | 53 1/4 | 51 1/2 |
| New York Occid Mixed No 2 (cents p 56 lb) | 89 | 88 3/4 | 90 1/4 | 88 3/4 | 89 | 78 7/8 | 57 1/4 | 72 3/4 | 63 [illegible]/8 |
| **Linseed** | | | | | | | | | |
| Buenos Aires (a) No 1 4% impurities (paper pesos p 100 kg) | 9.90 | 9.75 | 9.40 | 9.37 | 9.38 | n q | 14.34 | * 13.64 | 15.12 |
| London (c i f, shipping current or following month £ per long ton) | | | | | | | | | |
| La Plata | 12-5-0 | 12-5-0 | 11-15-0 | 11-15-0 | 11-15-0 | 15-0-0 | 11-6-3 | *14-2-0 | *12-2-3 |
| Bombay | 19-1-3 | 19-1-3 | 19-1-3 | 19-1-3 | 19-1-3 | 17-5-0 | 12-14-4 | 18-11-9 | *14-10-3 |
| Minneapolis No 1 Northern (cts p 56 lb) | 195 [illegible]/4 | 190 1/4 | 195 | 188 1/2 | 187 | 161 1/4 | 159 | 178 | 180 |
| **Cotton.** | | | | | | | | | |
| New Orleans Middling (cents p lb) | 15.05 | [3] 14.46 | 14.91 | 14.01 | 13.87 n | 10.46 n | 9.37 n | 10.03 | 8.75 |
| New York Middling (cents per lb) | 16.00 | [3] 15.43 | 15.80 | 15.03 | 14.78 n | 10.47 n | 9.75 n | 10.34 | 9.00 |

* Indicates that the product was not quoted during part of the period under review — n q = *not quoted* — n = *nominal* — (a) Thursday prices

(1) In relation to Government price fixing, numerous series are omitted from this table, notes concerning them have been given in various issues of the Crop Report see Jan 1941, p 39, Feb 1941 p 82, and May 1941 p 252 — (2) Commercial season August July, except for maize May April, and for linseed calendar year — (3) Quotation for July 2

## *B*) — Quotations for future delivery.

| Description | July 11 1941 | July 3 1941 | June 27 1941 | June 20 1941 | Monthly averages: June 1941 | July 1940 | July 1939 | July 1938 | July 1937 |
|---|---|---|---|---|---|---|---|---|---|
| **Wheat.** | | | | | | | | | |
| Winnipeg (cents p. 60 lb.) | | | | | | | | | |
| delivery July | 75 1/4 | 72 1/4 | 77 1/2 | 77 1/2 | 77 1/2 | 71 1/8 | 53 7/8 | 97 5/8 | 145 1/4 |
| October | 78 | 74 1/8 | — | — | — | 73 1/8 | 54 1/4 | 78 1/4 | 137 3/4 |
| Chicago (cents p. 60 lb.) | | | | | | | | | |
| delivery July | 105 1/8 | 104 1/4 | 106 1/2 | 100 1/8 | 102 | 74 3/4 | 65 5/8 | 71 1/2 | 122 5/8 |
| September | 106 7/8 | 105 1/2 | 107 7/8 | 102 1/4 | 103 1/2 | 75 1/4 | 66 | 71 1/2 | 123 3/8 |
| December | 108 1/8 | 106 5/8 | 109 1/2 | 104 1/8 | 105 1/8 | 76 1/4 | 67 1/8 | 73 3/8 | 125 3/4 |
| Buenos Aires (paper pesos p. 100 kg.) | | | | | | | | | |
| delivery August | 6.84 | 6.93 | 6.87 | 6.75 | 6.81 | 9.23 | 7.00 | 8.70 | 14.00 |
| September | 6.92 | 7.04 | 6.97 | 6.75 | 6.84 | 9.38 | 7.00 | 8.79 | 13.73 |
| **Rye** | | | | | | | | | |
| Winnipeg (cents p. 56 lb.) | | | | | | | | | |
| delivery July | 57 | 55 3/8 | 58 1/8 | 57 1/8 | 58 1/4 | 45 1/4 | 37 1/8 | 48 1/4 | 149 5/8 |
| October | 56 3/4 | 54 3/8 | 57 7/8 | 55 1/4 | 56 1/4 | 45 | 38 | 49 5/8 | 100 |
| December | 56 1/2 | 53 1/2 | 56 3/4 | 54 3/4 | 55 1/8 | 45 5/8 | 39 1/8 | 50 1/8 | 95 3/4 |
| Chicago (cents p. 56 lb.) | | | | | | | | | |
| delivery July | 58 1/2 | 56 | 57 3/4 | 56 | 57 | 42 7/8 | 41 | 52 7/8 | 93 |
| September | 58 3/4 | 57 1/8 | 59 1/8 | 57 1/4 | 58 1/4 | 44 1/4 | 42 1/8 | 54 5/8 | 86 7/8 |
| December | 61 1/4 | 60 | 62 | 60 | 60 7/8 | 46 | 44 1/2 | 57 | 88 3/4 |
| **Barley.** | | | | | | | | | |
| Winnipeg (cents p. 48 lb.) | | | | | | | | | |
| delivery July | 57 1/8 | 52 1/8 | 53 3/4 | 51 1/4 | 50 1/8 | 34 5/8 | 34 3/8 | 47 7/8 | 71 7/8 |
| October | 47 | 45 3/4 | 47 | 46 1/4 | 45 1/8 | 36 | 34 | 46 3/4 | 66 1/4 |
| December | 45 7/8 | 44 1/4 | 45 5/8 | 45 | 45 | 36 1/2 | 34 1/4 | 45 1/8 | 65 1/8 |
| Minneapolis (cents p. 48 lb.) | | | | | | | | | |
| delivery July | | | | n 46 3/4 | | * 34 | 31 5/8 | 40 3/4 | 62 1/4 |
| September | | | | n 47 | | 34 3/8 | 30 1/2 | 39 5/8 | 56 1/8 |
| **Oats.** | | | | | | | | | |
| Winnipeg (cents p. 34 lb.) | | | | | | | | | |
| delivery July | 40 1/8 | 40 | 41 3/8 | 38 1/4 | 38 5/8 | 32 1/8 | 26 1/4 | 41 | 63 |
| ,, October | 36 3/8 | 35 5/8 | 36 5/8 | 34 7/8 | 35 1/4 | 28 7/8 | 26 3/8 | 34 7/8 | 53 3/8 |
| ,, December | 34 | 33 3/4 | 34 3/4 | 33 1/4 | 33 7/8 | 27 1/8 | 26 | 32 1/4 | 50 |
| Chicago (cents p. 32 lb.) | | | | | | | | | |
| delivery July | 37 1/4 | 37 3/8 | 38 1/8 | 35 3/4 | 36 1/2 | 31 | 28 1/4 | 26 1/2 | 41 3/4 |
| ,, September | 38 3/4 | 37 7/8 | 39 1/8 | 36 3/8 | 37 1/4 | 28 3/4 | 27 1/2 | 25 3/4 | 35 3/4 |
| ,, December | 39 7/8 | 39 1/8 | 40 1/4 | 37 1/8 | 38 1/2 | 29 5/8 | 28 1/8 | 27 | 37 1/2 |

* Indicates that the product was not quoted during part of the period under review

| Description | July 11 1941 | July 3 1941 | June 27 1941 | June 20 1941 | Monthly averages: June 1941 | July 1940 | July 1939 | July 1938 | July 1937 |
|---|---|---|---|---|---|---|---|---|---|
| **Maize.** | | | | | | | | | |
| Chicago (cents per 56 lb.) | | | | | | | | | |
| delivery July | 73 1/2 | 73 1/4 | 74 3/4 | 73 1/8 | 73 5/8 | 62 | 43 1/4 | 57 7/8 | 119 5/8 |
| September | 75 1/2 | 75 [illegible]/8 | 77 1/4 | 75 3/8 | 75 5/8 | 59 5/8 | 43 7/8 | 59 | 106 7/8 |
| December | 78 3/8 | 77 5/8 | 79 1/4 | 77 3/4 | 77 5/8 | 56 1/2 | 44 7/8 | 57 3/4 | 78 [illegible] |
| **Linseed** | | | | | | | | | |
| Winnipeg (cents per 56 lb.) | | | | | | | | | |
| delivery July | 160 | n.q. | 163 | 150 3/4 | 153 1/2 | 130 | 138 3/8 | 144 1/4 | 179 1/2 |
| October | 151 3/4 | 15[illegible] | 158 | 147 7/8 | 150 3/4 | 132 1/4 | 132 | 145 3/4 | 181 1/2 |
| December | 149 1/2 | 14[illegible] | 153 3/4 | 146 3/8 | 151 | — | 127 1/2 | — | 179 1/2 |
| Duluth (cents per 56 lb.) | | | | | | | | | |
| delivery July | | | | n. 182 1/4 | | * 159 | 155 1/4 | 177 1/2 | 203 |
| Buenos Aires (paper pesos per 100 kg.) | | | | | | | | | |
| delivery August | 10.08 | 10.01 | * 9.79 | 9.31 | 9.55 | 15.45 | 14.24 | 14.66 | 16.09 |
| September | 10.24 | 10.31 | 9.97 | 9.38 | 9.59 | 15.45 | 14.30 | 14.63 | 16.14 |

* Indicates that the product was not quoted during part of the period under review.

# TRADE — LATEST INFORMATION

## ARGENTINA

### Exports for the month of June 1941 and 1940.

| Production and Unit | June 1941 | June 1940 | Production and Unit | June 1941 | June 1940 |
|---|---|---|---|---|---|
| Wheat | | | Maize | | |
| Thousand centals | 4 651 | 9 915 | Thousand centals | 259 | 3 062 |
| Thousand bushels of 60 lb. | 7 751 | 16 524 | Thousand bushels of 56 lb. | 463 | 5 467 |
| Wheat Flour | | | Linseed | | |
| Thousand centals | 65 | 98 | Thousand centals | 1 038 | 636 |
| Thousand barrels of 196 lb. | 33 | 50 | Thousand bushels of 56 lb. | 1 854 | 1 135 |
| Rye | | | Cotton | | |
| Thousand centals | 108 | 170 | Thousand centals | 224 | 24 |
| Thousand bushels of 56 lb. | 193 | 303 | Thousand bales of 478 lb. | 47 | 5 |
| Barley | | | Wool Thousand lb. a) | 31 855 | 12 106 |
| Thousand centals | 77 | 31 | Wool Thousand lb. b) | 13,307 | 5,335 |
| Thousand bushels of 48 lb. | 160 | 64 | Butter Thousand lb. | 996 | 3,944 |
| Oats | | | | | |
| Thousand centals | 37 | 56 | | | |
| Thousand bushels of 32 lb. | 115 | 175 | Cheese Thousand lb. | 3,254 | 871 |

*a)* Unswashed wool — *b)* Washed wool

# AVERAGE MONTHLY PRICES BY COUNTRIES.[1]

## GERMANY (Prices in Reichsmarks per quintal)[1]

| Groups | Description | June 1941 | May 1941 | April 1941 | Average Jan.-March 1941 | Average April-June 1940 | Average April-June 1939 | Agricultural year ([2]) 1939-40 | Agricultural year ([2]) 1938-39 |
|---|---|---|---|---|---|---|---|---|---|
| A I | †Wheat (Berlin) | 21.60 | 21.40 | 21.20 | 20.80 | 21.40 | 21.37 | 20.50 | 20.56 |
| | †Rye (Berlin) | 19.90 | 19.70 | 19.50 | 19.10 | 19.70 | 19.67 | 18.80 | 18.81 |
| | †Barley, feeding (Berlin) | 18.00 | 17.90 | 17.80 | 17.57 | 17.90 | 17.40 | 17.22 | 17.08 |
| | †Oats (Berlin) | 18.80 | 18.70 | 18.60 | 18.40 | 18.00 | 16.00 | 17.65 | 17.51 |
| | †Potatoes, red (Berlin) | 5.70 | 5.40 | 5.20 | 4.93 | 5.30 | 5.40 | * 4.90 | * 5.02 |
| | Hops (Nurnberg) | 440.00 | 450.00 | 450.00 | 440.00 | 458.00 | * 570.00 | * 457.60 | * 493.45 |
| A II | †Oxen, live weight (Berlin) | 95.00 | 88.60 | 85.20 | 87.93 | 86.41 | 86.33 | 87.20 | 86.35 |
| | Calves, live weight (Berlin) | 95.40 | 93.40 | 95.00 | 95.40 | 95.40 | 95.40 | 95.25 | 95.40 |
| | †Pigs, live weight (Berlin) | 111.00 | 110.20 | 106.40 | 104.00 | 104.40 | 100.40 | 104.70 | 101.67 |
| | Milk, fresh (Berlin) per hectolitre | 19.10 | 19.10 | 19.10 | 19.10 | 19.04 | 16.67 | * 17.74 | 16.11 |
| | †Butter, National Mark | 313.00 | 313.00 | 313.00 | 313.00 | 313.00 | 274.00 | 286.00 | 257.68 |
| | Creamery butter | 297.00 | 297.00 | 297.00 | 297.00 | 297.00 | 260.00 | 271.33 | 271.69 |
| | †Cheese, Emmental type (Kempten) | 186.75 | 186.75 | 186.75 | 186.75 | 186.75 | 160.00 | 172.13 | 160.00 |
| | Soft cheese, butterfat (Kempten) | 65.25 | 65.25 | 65.25 | 65.25 | 65.25 | 58.00 | 60.36 | 58.00 |
| | †Eggs, average size marked "G I B" (Berlin) per 100 | 10.50 | 10.50 | 10.50 | 11.04 | 10.50 | 8.94 | 10.88 | 10.35 |
| B I | †Basic slag, 16% (Aachen) ([3]) | 0.19 | 0.220 | 0.220 | 0.220 | 0.192 | 0.209 | 0.201 | 0.214 |
| | †Superphosphate of lime 18% ([3] [4]) | 0.298 | 0.314 | 0.314 | 0.312 | 0.309 | 0.309 | 0.309 | 0.309 |
| | †Potash salts 40% ([4]) | 4.69 | 5.24 | 5.24 | 5.24 | 4.96 | 4.83 | 5.06 | 5.05 |
| | †Sulphate of ammonia, 20.5% ([3] [4]) | 0.410 | 0.450 | 0.485 | 0.478 | 0.443 | 0.480 | 0.451 | 0.457 |
| B II | Wheat bran (Hamburg) | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 |
| | Rye bran (Hamburg) | 10.75 | 10.75 | 10.75 | 10.75 | 10.75 | 10.75 | 10.75 | 10.75 |
| | Oaten pod (Northern Germany) | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 |
| | Potato flakes (Hamburg) | 17.90 | 17.70 | 17.50 | 17.10 | 17.70 | 17.67 | 16.88 | 17.08 |
| | Dried sugar beet residue | 12.65 | 12.51 | 12.37 | 12.09 | 12.51 | 12.45 | 12.32 | 12.34 |
| | Rape seed cake meal | 14.22 | 14.22 | 14.22 | 14.22 | 14.22 | — | — | — |

## BELGIUM (Prices in Belgian francs per quintal)

| Groups | Description | June 1941 | May 1941 | April 1941 | Average Jan.-March 1941 | Average April-June 1940 | Average April-June 1939 | Agricultural year ([2]) 1939-40 | Agricultural year ([2]) 1938-39 |
|---|---|---|---|---|---|---|---|---|---|
| A I | Wheat (Antwerpen) ([5]) | 170.00 | 170.00 | 170.00 | 170.00 | [10] 156.00 | 129.70 | * 141.35 | 123.80 |
| | Rye (Antwerpen) ([5]) | 155.00 | 155.00 | 155.00 | 155.00 | [10] 140.50 | n q | * 128.80 | n q |
| | Barley (Antwerpen) ([5]) | 150.00 | 150.00 | 150.00 | 150.00 | [10] 170.00 | n q | * 158.40 | n q |
| | Oats (Antwerpen) ([5]) | 145.00 | 145.00 | 145.00 | 145.00 | [10] 129.00 | 87.15 | * 101.85 | 90.60 |
| | †Potatoes (Leuven) ([6]) | 85.00 | 80.00 | 77.00 | 71.35 | [10] 50.00 | 37.70 | * 38.50 | 35.15 |
| | †Flax fibre (Gent) ([7]) | 2,300.00 | 2,300.00 | 2,300.00 | 2,300.00 | [10] 3,313.00 | 1,691.65 | * 2,475.00 | 1,702.15 |
| A II | Oxen, live weight (Curegem Anderlecht) ([8]) | 1,100.00 | 1,100.00 | 1,100.00 | 966.65 | [10] 598.00 | 522.00 | * 519.70 | 510.00 |
| | Calves, live weight (Curegem Anderlecht) ([8]) | 1,200.00 | 1,200.00 | 1,200.00 | 1,033.35 | [10] 919.00 | 783.00 | * 736.40 | 825.00 |
| | Pigs 220-265 lb. live weight (Curegem Anderlecht) ([8]) | 1,200.00 | 1,200.00 | 1,200.00 | 1,133.35 | [10] 740.00 | 664.00 | * 665.00 | 801.00 |
| | †Butter (Antwerpen) ([9]) | 2,900.00 | 3,100.00 | 3,100.00 | 3,100.00 | [10] 2,349.00 | 1,912.55 | * 2,162.00 | 2,272.00 |
| | †Eggs (Antwerpen) per 100 | 110.00 | 110.00 | 110.00 | 110.00 | [10] 49.25 | 44.80 | * [illegible] | 57.85 |

* Indicates that the product was not quoted during part of the period under review. — n q = not quoted; n = nominal.

† Indicates that the series is published in the *International Yearbook of Agricultural Statistics*.

(1) Prices of plant (A I) and animal (A II) products sold by the farmer, also of fertilisers (B I) and concentrated feeding stuffs (B II) bought by the farmer. In cases where the market is not indicated the price is the average for the whole country. — (2) July to June. — (3) Price per kg. of active fertiliser contained in 100 kg. of commercial fertiliser. — (4) Free at buyer's station. — (5) As from Aug. 1940 maximum price to producers free at point of delivery. — (6) As from Sept. 1940 fixed price to producers for average quality. — (7) As from Jan. 1941 fixed price for best quality of blue flax fibre. — (8) As from Sept. 1940 maximum price. — (9) As from Aug. 1940 fixed price at creamery to be paid by wholesalers. — (10) April 1940.

## DENMARK (Prices in Danish crowns per quintal)

| Groups | Description | June 1941 | May 1941 | April 1941 | Jan March 1941 | April June 1940 | April June 1939 | Agricultural year 1939 40 | Agricultural year 1938 39 |
|---|---|---|---|---|---|---|---|---|---|
| A I | Wheat (Kobenhavn) (¹) | 28 00 | 28 00 | 28 00 | 28 00 | 18 70 | 14 59 * | 17 98 * | 14 54 |
| | Rye (¹) | 29 00 | 29 00 | 29 00 | 29 00 | 19 70 | 15 06 | 18 93 | 14 43 |
| | Barley (Kobenhavn) (¹) | 25 00 | 25 00 | 25 00 | 25 00 | 17 70 | 11 69 * | 16 18 | 12 12 |
| | Oats (Kobenhavn) (¹) | 25 00 | 25 00 | 2 00 | 25 00 | 17 70 | 12 74 * | 16 72 | 12 14 |
| A II | †Cows live weight (København) | 10 87 | 96 87 | 100 90 | 90 62 | 52 38 | 46 78 | 50 99 | 42 63 |
| | †Pork dead weight | 236 00 | 236 00 | 236 00 | 235 73 | 181 78 | 165 70 | 180 23 | 151 27 |
| | Fresh milk | 23 46 | 23 46 | 23 46 | 23 46 | 16 75 | 14 08 | 15 57 | 14 25 |
| | †Butter (Kobenhavn) | 389 00 | 389 00 | 389 00 | 389 00 | 262 00 | 219 48 | 252 76 | 237 95 |
| | Whole milk cheese 45 (Odense) (²) | 180 00 | 180 00 | 180 00 | 185 68 | 156 67 | 133 67 | 152 31 | 137 60 |
| | †Eggs for export | 186 50 | 175 60 | 190 00 | 174 87 | 96 58 | 87 37 | 122 33 | 112 26 |
| B I | †Superphosphate 18 % | | 15 25 | 15 25 | n q | 9 75 | 6 80 | 7 95 | 6 63 |
| | Potash salts 40 % | | 19 85 | 19 85 | 19 45 | 17 50 | 13 95 | 16 15 | 13 49 |
| | †Sulphate of ammonia 20 8 % | | 23 65 | 23 65 | 22 80 | 18 60 | 17 10 | 17 70 | 16 57 |
| | †Nitrate of lime 15 ½ % | | 23 40 | 23 40 | 22 60 | 18 55 | 17 05 | 17 65 | 16 52 |
| B II | Maize Plata | n q | n q | n q | n q | * 18 70 | 14 94 * | 18 79 | 15 5[illegible] |
| | Wheat bran Danish | n q | n q | n q | n q | n q | 11 41 * | 16 87 | 11 8 |
| | Cottonseed cake | n q | n q | n q | n q | 26 37 | 15 15 * | 25 61 | 15 2[illegible] |
| | †Sunflower seed cake | n q | n q | n q | n q | * 27 25 | 15 77 * | 22 51 | 16 21 |
| | Buttermilk powder | n q | n q | n q | 116 33 | 97 50 | 63 00 * | 86 0[illegible] | [illegible] |

## ITALY (Prices in lire per quintal)

| Groups | Description | June 1941 | May 1941 | April 1941 | Jan March 1941 | April June 1940 | April June 1939 | Agricultural year 1939 40 | Agricultural year 1938 39 |
|---|---|---|---|---|---|---|---|---|---|
| A I | †Wheat soft (Milano) (³) | 190 00 | 155 75 | 155 75 | 155 75 | 155 75 | 148 00 | 151 05 | 148 00 |
| | Wheat hard red (Catania) (⁴) | 205 00 | 164 75 | 164 7 | 164 75 | 164 75 | 157 00 | 160 05 | 157 00 |
| | Oats (Milano) (³ ⁴) | 135 00 | 135 00 | 135 00 | 135 00 | 158 75 | 99 60 | 131 15 | 97 05 |
| | †Maize (Milano) (⁵ ⁶) | 120 00 | 120 00 | 120 00 | 120 00 | 110 15 | 90 00 * | 109 15 * | 90 00 |
| | Rice, Vialone (Milano) | 287 30 | 261 30 | 281 20 | 279 70 | 281 65 | 253 00 | 270 50 | 249 30 |
| | Rice Maratelli (Milano) | 216 90 | 215 90 | 215 90 | 214 70 | 216 25 | 197 35 | 207 65 | 193 60 |
| | †Rice, Originario (Milano) | 185 80 | 184 80 | 184 80 | 183 20 | 185 15 | 166 75 | 176 80 | 163 45 |
| | †Hemp fibre (⁵) | 710 00 | 710 00 | 710 00 | 710 00 | 590 00 | 590 00 | 590 00 | 590 00 |
| | †Olive oil sopraffino locale (Bari (⁶) | 864 | 860 25 | 856 25 | 848 25 | 873 25 | 732 65 | – | 712 00 |
| | †Wine ordinary 11° (Bari) per hectolitre (⁷) | 141 00 | 465 50 | 451 50 | 258 65 | 201 30 | 95 05 | 164 40 | 117 60 |
| A II | †Oxen live weight 1st quality (Milano) (⁵) | n q | 511 00 | 494 50 | 537 85 | 590 00 | 491 10 | 518 25 | 458 30 |
| | Lambs dead weight (Roma)(⁵) | 1 125 00 | 1 125 00 | 1 125 00 | 1 045 65 | 890 10 | 794 65 | 838 30 | 725 85 |
| | Pigs 40 kg and more live weight (Milano) ( ) | 870 00 | 870 00 | 870 00 | 870 00 | 780 00 | 582 25 | 697 00 | 537 50 |
| | †Cheese Parmigiano Reggiano (Milano) | 1 973 70 | 1 665 65 | 1 596 30 | 1 565 70 | 1 519 80 | 1,211 50 | 1 300 25 | 1 205 75 |
| | Eggs (Milano) per 100 (⁵) | 14 30 | 12 33 | 11 67 | 87 55 | 61 30 | 45 15 | 64 40 | 53 20 |
| | Wool « Romana Vissana » (Roma) (⁵) | 3 274 00 | 3 194 20 | 3 141 00 | 3 141 00 | 2 781 65 | 2 602 00 | 2 646 90 | 2 602 00 |
| B I | †Superphosphate of lime 14–16 % (Milano) | 30 20 | 30 20 | 30 20 | 30 20 | 30 10 | 24 75 * | 26 90 | 24 75 |
| | Chloride of potash 50 % (Milano) | 82 60 | 82 60 | 82 60 | 82 60 | 82 50 | 71 50 | 76 55 | 71 50 |
| | †Nitrate of lime 15 16 % (Milano) | 117 75 | 117 75 | 117 75 | 116 80 | 117 65 | 95 90 * | 100 90 | 92 35 |
| | Sulphate of ammonia 20–21 % (Milano) | 110 20 | 110 20 | 110 20 | 109 25 | 110 10 | 91 10 * | 95 55 | 88 10 |
| | †Cyanamide of calcium 15 16 % (Milano) | 118 00 | 118 00 | 118 00 | 117 60 | 118 00 | 96 75 * | 102 20 | 70 25 |
| | †Copper sulphate 98 99 % (Genova) | n q | n q | n q | n q | 231 50 | 188 50 * | 222 70 * | 189 30 |
| B II | Wheat bran (Milano) | 62 85 | 62 85 | 62 85 | 62 85 | 62 85 | 60 00 | 61 10 | 60 00 |
| | Rice bran (Milano) | 83 00 | 83 00 | 83 00 | 83 00 | 83 00 | 80 00 | 81 20 | 74 35 |
| | Linseed cake (Milano) (⁵ ⁸) | 90 00 | 90 00 | 90 00 | 90 00 | 90 00 | 81 00 | 83 25 | 81 00 |
| | Groundnut cake (Milano)(⁵ ⁸) | 75 00 | 75 00 | 75 00 | 75 00 | 75 00 | 65 00 | 67 50 | 62 00 |
| | †Rapeseed cake (Milano) (⁵ ⁸) | 42 00 | 42 00 | 42 00 | 42 00 | 42 00 | 36 00 | 37 50 | 36 00 |

* † see notes on preceding page

(¹) As from Sept 1940 maximum price paid to producers — (²) As from I 1 1941 cheese 20 % f t — (³) Selling prices free at mill — (⁴) Selling prices free at depot (ammassi) — (⁵) These prices do not include the tax of 2 per cent on sale levied as from Feb 8 1940 — (⁶) As from Sept 1940 price paid to producers — (⁷) As from July 1939 prices per hl for wine 14° in Barletta — (⁸) Prices free at factory

## NETHERLANDS (Prices in florins per quintal)

| Groups | Description | June 1941 | May 1941 | April 1941 | Jan.-March 1941 | April-June 1940 | April-June 1939 | Agricultural year 1939-40 | Agricultural year 1938-39 |
|---|---|---|---|---|---|---|---|---|---|
| A I | Wheat [1] | 12.49 | 12.49 | 12.45 | 12.20 | 11.47 | 10.45 | 10.98 | 10.05 |
| | Rye (Groningen) [2] | 11.49 | 11.49 | 11.45 | 11.20 | 9.73 | 8.26 | 9.05 * | 7.68 |
| | Barley (Groningen) [2] | 10.99 | 10.99 | 10.95 | 10.70 | 9.00 * | 8.01 | 8.88 | 7.66 |
| | Oats (Groningen) [2] | 9.49 | 9.49 | 9.45 | 9.20 | 8.00 | 7.26 | 7.86 | 6.45 |
| | Peas (Rotterdam) [2] | 13.71 | 13.59 | 13.46 | 13.20 | n. q. | 12.87 * | 10.66 | 11.81 |
| | Flax, fibre (Rotterdam) | n. q. | .. | 125.00 | 121.67 | n. q. | 72.50 * | 85.33 * | 71.04 |
| | †Potatoes (Amsterdam) | 6.02 | 6.02 | 6.02 | 6.02 | 4.72 | 3.89 * | 4.45 * | 4.16 |
| A II | †Beef, dead weight (Rotterdam) [3] | 61.00 | 61.00 | 61.00 | 61.00 | 84.66 | 75.33 | 78.92 | 72.87 |
| | †Pigs, live weight (Rotterdam) [3] | 72.00 | 72.00 | 72.00 | 70.00 | 63.33 | 46.00 | 60.50 | 49.50 |
| | Butter price for home consumption | 195.00 | 195.00 | 195.00 | 195.00 | 157.00 | 131.00 | 151.00 | 138.00 |
| | †Cheese, Edam 40 + (Alkmaar) | 70.50 | 70.50 | 70.50 | 70.50 | 40.93 | 34.07 | 42.18 | 40.06 |
| | Cheese, Gouda 45 + (Gouda) | 82.50 | 82.50 | 83.00 | 83.00 | 52.58 | 44.65 | 57.72 | 50.26 |
| | †Eggs, for export (Roermond) per 100 [2-4] | 107.00 | 107.00 | 107.00 | 107.00 | 3.45 | 3.25 | 4.01 | 3.76 |
| B I | Basic slag, 16 % (Zwolle) | n. q. | n. q. | n. q. | * 1.81 | 1.93 | 2.18 | 2.26 | 2.19 |
| | Superphosphate, 14 % (Zwolle) [5] | n. q. | ... | 4.70 | 4.67 | 2.38 | 1.70 | 2.17 | 1.66 |
| | Kainite, 14 % (Zwolle) | 1.73 | . | 1.76 | 1.74 | 1.61 | 1.62 | 1.64 | 1.63 |
| | Nitrate of soda, 15 ½ % (Zwolle) | n. q. | . | 9.95 | 9.95 | 8.01 | 6.51 | 6.85 | 6.32 |
| | Sulphate of ammonia, 20 % (Zwolle) | 6.25 | .. | 6.35 | 6.33 | 5.85 | 5.58 | 5.54 | 5.47 |
| B II | †Maize (Rotterdam) | 10.75 | 10.75 | 10.75 | 10.75 | 8.31 | 7.94 | 6.14 | 8.00 |
| | †Linseed cake, Dutch (Rotterdam) | 12.25 | 12.25 | 12.25 | 12.25 | n. q. | 8.42 * | 8.51 | 8.65 |
| | †Coconut cake, (Rotterdam) | n. q. | n. q. | n. q. | n. q. | n. q. | 7.75 * | 7.84 | 7.90 |
| | †Groundnut cake, (Rotterdam) | n. q. | n. q. | n. q. | n. q. | n. q. | 7.92 * | 8.22 | 7.91 |
| | Crushed soya extraction residue (Zwijndrecht) | 12.50 | 12.50 | 12.50 | 12.67 * | 8.00 | 7.99 * | 7.94 | 7.81 |

## SWEDEN (Prices in Swedish crowns per quintal)

| Groups | Description | June 1941 | May 1941 | April 1941 | Jan.-March 1941 | April-June 1940 | April-June 1939 | Agricultural year 1939-40 | Agricultural year 1938-39 |
|---|---|---|---|---|---|---|---|---|---|
| A I | Wheat (Stockholm) | n. q. | n. q. | n. q. | * 27.00 | 21.29 | 17.67 * | 19.64 * | 17.36 |
| | Rye (Stockholm) | n. q. | n. q. | n. q. | * 27.00 | 21.34 | 16.67 * | 19.59 * | 16.66 |
| | Barley | n. q. | n. q. | n. q. | * 25.00 | n. q. | 13.39 * | 16.50 * | 13.44 |
| | Oats (Stockholm) | n. q. | n. q. | n. q. | * 22.50 | n. q. | 11.17 * | 16.17 * | 11.40 |
| A II | Cows, live weight (Stockholm) | .. | 98.00 | 117.00 | 95.00 | 75.67 | 64.67 | 72.33 | 63.17 |
| | Pigs, live weight (Goteborg) | ... | 148.00 | 145.00 | 137.00 | 109.00 | 98.33 | 104.83 | 102.58 |
| | Butter (Malmo; prices for the home market) | 355.00 | 355.00 | 405.00 | 405.00 | 300.00 | 275.00 | 300.00 | 271.08 |
| | Eggs (Stockholm) | 196.25 | 185.00 | 178.00 | 215.63 | 133.00 | 112.33 | 150.46 | 135.92 |
| B I | Superphosphate, 20 % | 10.10 | 10.10 | 10.10 | 10.05 | 9.80 | 7.30 | 6.62 | 7.25 |
| | Potash salts, 40 % | 15.60 | 15.60 | 15.60 | 15.60 | 15.60 | 12.55 | 14.62 | 12.32 |
| | Nitrate of soda, 15 ½ %-16 % | 20.75 | 20.75 | 20.75 | 20.75 | 18.90 | 17.25 | 18.07 | 17.45 |
| | Nitrate cyanamide, 15 ½ % | 20.75 | 20.75 | 20.75 | 20.75 | 17.05 | 16.55 | 16.81 | 16.75 |
| B II | Maize, Plata | n. q. | n. q. | n. q. | n. q. | 18.50 | 18.53 * | 18.68 | 17.43 |
| | Wheat-bran | 16.50 | 16.50 | 16.50 | 16.50 | 17.41 | 12.27 | 15.63 | 12.98 |
| | Rye bran | 15.50 | 15.50 | 15.50 | 15.50 | 16.52 | 10.83 | 14.60 | 11.54 |
| | Weat meal for feed | 22.00 | 22.00 | 22.00 | 22.00 | n. q. | n. q. | — | — |
| | Feeding cellulose | 17.25 | 18.00 | 18.00 | 18.00 | n. q. | n. q. | — | — |
| | Concentrated feeding mixture 48 % | 23.50 | 23.50 | 23.50 | 23.50 | 23.50 | 20.15 | 23.10 | 20.14 |
| | Groundnut cake | n. q. | n. q. | n. q. | n. q. | 24.50 | 20.05 | 23.72 | 20.14 |
| | Cottonseed cake | n. q. | n. q. | n. q. | n. q. | 23.00 | 19.54 | 22.50 | 19.53 |
| | Soya meal | 23.00 | 23.00 | 23.00 | * 23.00 | 23.00 | 20.57 | 22.77 | 20.35 |

*, †: See notes on page 365.

(1) Fixed prices, free at producer's station — (2) As from Sept. 1939 fixed prices, free at producer's station — (3) As from Nov. 1940: fixed prices. — (4) As from Nov. 1940: price per 100 kg. — (5) As from Jan 1941: superphosphate 17 %.

# *APPENDIX*

## THE 1939 CENSUS OF HORTICULTURAL HOLDINGS IN GERMANY

Following upon the Census of agricultural and forest holdings in May 1939 a Census of horticultural holdings took place in Germany in December 1939. It covered only holdings producing for sale. Horticultural holdings in the proper sense of the word were included as well as the production of garden plants in agricultural and other holdings as long as it was meant for sale. The Census covered the German territory of 1939 without Dantzig, the Memel district and the territories annexed in the East. In the area given are not included areas under glass used for the production of garden plants. For the classification in size groups total area of holdings has been considered and not the actual size of the area upon which garden plants were grown.

1. *Number of holdings and open land area used for horticulture in 1939 according to size classes*

| Total area of holding | Number of holdings | Percentages of holdings: connected with agricultural holdings | Percentages of holdings: where horticulture is the main source of income | Open land area used for horticulture |
|---|---|---|---|---|
| | | percent | percent | acres |
| Below ·5 hectare | 37 585 | 11.0 | 20.3 | 16 789 |
| From ·5 to less than 2 hectare | 72 699 | 36.5 | 37.7 | 93 276 |
| From 2 to less than 5 hectares | 56 299 | 84.9 | 26.8 | 99,372 |
| From 5 to less than 20 hectares | 84 238 | 97.1 | 9.9 | 160 777 |
| 20 hectares and more | 33 001 | 97.5 | 3.7 | 176 174 |
| TOTAL | **283 822** | **67.8** | **21.0** | **546,388** |

Out of the total number 67.8 per cent were connected with agriculture, thus that either an horticultural holding carried on some agricultural activity as well, or that an agricultural estate produced some garden plants or had a separate gardening branch (estate gardens).

In the case of one fifth of the numbered holdings, horticulture was the main source of income of their holders. This ratio is likely to correspond on the whole to that of independent professional gardeners.

The share of horticulture in the total agricultural and forest economy is, as far as the number of holdings is concerned, 2.8 per cent of all the holdings numbered in 1939 and 6.3 per cent of those of half hectare and over. As regards area the ratio is far smaller reaching in both instances 0.4 per cent.

2. — The following totals have been ascertained for the various branches of horticulture, as to the number of holdings and the open land area used for horticulture :

II. — *Number of holdings and area according to the various kinds of crops.*

| Classification | Number of holdings | | Open land area used for horticulture | |
|---|---|---|---|---|
| | absolute data | percent. of total | acres | percent. of total |
| Field-grown vegetables | 159,302 | 56.1 | 266,080 | 48.7 |
| Fruit culture | 129,712 | 45.7 | 174,669 | 32.0 |
| Nurseries | 9,932 | 3.5 | 28,509 | 5.2 |
| Commercial horticulture | 59,958 | 21.1 | 77,130 | 14.1 |
| including flowers | (30,175) | (10.6) | (16,643) | (3.0) |
| vegetables | (47,437) | (16.7) | (47,279) | (8.6) |
| Total | **283,822** | **100.0** | **546,388** | **100.0** |

A division of those totals among the various size groups according to the total cultivated area shows that the percentage of the field grown vegetables rises, as far as the number of holdings is concerned, from 40.8 per cent. in the case of the smallest holdings to 63.6 per cent. in that of holdings between 5 and 20 hectares; and, as far as the area is concerned, from 30.8 per cent. in the case of the smallest holdings to 59.3 per cent. in that of holdings above 20 hectares. In all the other branches, the share of the small or smallest holdings is everywhere higher than that of the larger ones, both as far as the number and the area are concerned. This is particularly striking in the case of commercial horticulture, where the share of both groups under two hectares is 34.0 and 33.3 per cent. respectively as to the number, and 29.7 and 29.5 per cent. respectively as to the area, while that of the two groups avove five hectares is 10.0 and 12.8 per cent. respectively as to the number, and 8.4 (for both groups) as to the area. The differences are relatively unimportant in the case of fruit crops, where the percentages lie, for the

III. — *Open land area under the various kinds of crops (in acres)*

| Total area of holdings | Field-grown vegetables | Fruit culture | Nurseries | Commercial horticulture | Including | |
|---|---|---|---|---|---|---|
| | | | | | Flowers | Vegetables |
| Below 0.5 hectare | 5,167 | 6,378 | 262 | 4,982 | 1,710 | 2,847 |
| From 0.5 to less than 2 hectares | 29,648 | 33,164 | 2,903 | 27,500 | 7,791 | 16,045 |
| From 2 to less than 5 hectares | 43,202 | 34,548 | 5,258 | 16,364 | 3,116 | 10,129 |
| From 5 to less than 20 hectares | 83,533 | 53,912 | 9,887 | 13,445 | 2,491 | 7,964 |
| 20 hectares and more | 104,530 | 46,667 | 10,139 | 14,839 | 1,535 | 10,294 |
| Total | **266,080** | **174,669** | **28,509** | **77,130** | **16,643** | **47,279** |

IV — *Number of holdings according to the various kinds of crops.*

| TOTAL AREA OF HOLDINGS | Field grown vegetables | Fruit culture | Nurseries | Commercial horticulture | Including Flowers | Including Vegetables |
|---|---|---|---|---|---|---|
| Below 0 5 hectare | 15,324 | 16,117 | 1,069 | 12,783 | 7,107 | 10,060 |
| From 0 5 to less than 2 hectares | 35,605 | 36,857 | 3,630 | 24,193 | 14 979 | 19,362 |
| From 2 to less than 5 hectares | 34,077 | 26,665 | 2,453 | 10,304 | 4,525 | 8 001 |
| From 5 to less than 20 hectares | 53,592 | 35,720 | 2,005 | 8,451 | 2,209 | 6,546 |
| 20 hectares and more | 20,704 | 14,353 | 775 | 4,227 | 1,355 | 3,468 |
| TOTAL | **159,302** | **129,712** | **9,932** | **59,958** | **30,175** | **47,437** |

number of the holdings, between 42 and 51 per cent and, for the area – apart from the holdings above 20 hectares, where it is 26 5 per cent – btween 33 and 38 per cent.

## THE GENERAL CENSUS OF AGRICULTURE IN SWEDEN IN 1937

In Sweden a general census of agriculture was taken in 1937, following the same method used in 1927 and in 1932, i e in connection with the census of land taxation. The required information had to be furnished not later than September 15, 1937. The rural economic societies were asked, through their organizations, to verify and, if necessary, to complete the data of the agricultural census The census results were classified by the Central Statistical Bureau, who published then this year in a volume called Jordbruksrak ringen År 1937 »—

This census has covered 289,114 small holdings having a maximum of one quarter of hectare (1 hectare is about 2 ½ acres) of arable land, with a total area of 368,664 acres; 418,644 holdings having more than one quarter of hectare of arable land, with a total area of 48,595,218 acres, and 48,709,185 acres of "distant land" (Utmark) —

I — *Distribution of holdings according to extent of arable land*

| CLASSIFICATION OF HOLDINGS ACCORDING THE EXTENT OF ARABLE LAND | Number | Area of arable land (acres) |
|---|---|---|
| Up to 0,25 ha | 289,114 | 11 666 |
| From 0 26 to 1 ha | 52,335 | 91,504 |
| » 1 to 2 » | 58,990 | 245,416 |
| » 2 to 5 » | 113,722 | 1,022,233 |
| » 5 to 10 » | 97,298 | 1,800 614 |
| » 10 to 20 » | 60,441 | 2,135,462 |
| » 20 to 50 » | 28,487 | 2 107,929 |
| » 50 to 100 » | 5,077 | 857,797 |
| Over 100 ha | 2,294 | 947,109 |
| *General Total* | ***707,758*** | ***9,219,730*** |
| Total holdings over 0 25 ha | 418,644 | 9,208,065 |

The distribution of the holdings according to the extent of the arable land which they comprise is indicated by Table 1. It shows that agricultural holdings in Sweden are mostly of small or medium extent. The large holdings having more than 100 hectares of arable land make altogether only 10.3 per cent of all arable lands.

As to tenure the available data consider only holdings having more than two hectares of arable land. They are indicated by Table 2. Holdings cul[illegible]

*2. – Distribution of holdings with arable area of over 2 hectares according to tenure*

| CLASSIFICATION OF HOLDINGS ACCORDING TO EXTENT OF ARABLE LAND | Number of holdings: Run by owner | Number of holdings: Tenant | Number of holdings: Total | Area of arable land of the holdings: Run by owner | Area of arable land of the holdings: Tenant | Area of arable land of the holdings: Total |
|---|---|---|---|---|---|---|
| | | | | acres | acres | acres |
| [illegible] | 95 61[illegible] | 18 110 | 11[illegible] 72[illegible] | [illegible]19 284 | 17[illegible] 949 | 1 0[illegible] [illegible]33 |
| [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | 1 800 614 |
| [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] 462 |
| [illegible] | 19 0[illegible] | [illegible] | [illegible]8 487 | 1 370 10[illegible] | [illegible] | [illegible]107 [illegible] |
| [illegible] | [illegible] | 2 147 | [illegible] | [illegible] | [illegible] | [illegible]7 797 |
| Over [illegible] | [illegible] | 760 | [illegible] | [illegible] | 84 489 | 947 10[illegible] |
| *Total* | [illegible] | [illegible] | 307 [illegible]19 | [illegible] | [illegible] | 8 871 144 |

[illegible] by tenants represent only 10.[illegible] per cent of the total number and the [illegible] of their arable land constitute [illegible] per cent of the arable land of all holdings under consideration.

The distribution of the [illegible] according to utilization [illegible] appears from Table 3. Table 4 gives [illegible] distribution of the [illegible] of holdings according to the extent of their arable land.

*3. – Area covered by Census according to utilization*

| CLASSIFICATION | Holdings up to 0.25 hectare of arable land | Holdings with more than 0.25 hectare of arable land | Outlying land ([illegible]) | Total |
|---|---|---|---|---|
| | acres | acres | acres | acres |
| Arable land | 11 666 | 9 208 064 | — | 9 219 730 |
| Vegetable gardens and orchards | 1 675 | 349 906 | | 351 581 |
| Permanent meadows for hay | 3 148 | 761 516 | 66 082 | 830 746 |
| Pastures | 2 965 | 1 637 196 | 47 158 | 1 687 319 |
| Forests | 82 925 | 27 222 602 | 27 938 230 | 55 243 757 |
| Other land | 266 285 | 9 415 933 | 20 657 714 | 30 339 932 |
| *Total* | 368 664 | 48 595 217 | 48 709 184 | (1) 97 673 065 |

(1) The difference between this data and the total land area of Sweden (101 3[illegible] 000 acres) is due to roads, uncultivated marshes, marshy land, mountains etc.

4. — *Area of holdings according to utilisation.*

| Classification on holdings according to extent of arable land | Arable land | Vegetable gardens and orchards | Permanents meadows and pastures | Forests | Other land | Total area of holdings |
|---|---|---|---|---|---|---|
| | acres | acres | acres | acres | acres | acres |
| Up to 0 25 ha | 11,666 | 1,675 | 6,113 | 82,925 | 266,285 | 368,664 |
| From 0 26 to 1 ha | 91,504 | 12,993 | 89,955 | 703,873 | 534,250 | 1,432,575 |
| 1 to 2 » | 245,416 | 25,457 | 177,506 | 1,684,152 | 901,118 | 3,033,649 |
| » 2 to 5 » | 1,022,233 | 67,505 | 559,788 | 6,551,176 | 2,684,847 | 10,885,549 |
| » 5 to 10 » | 1,800,614 | 77,713 | 588,794 | 7,514,251 | 2,170,235 | 12 151,607 |
| » 10 to 20 » | 2,135,462 | 68,209 | 405,400 | 4,647,735 | 1,051,520 | 8,308 326 |
| » 20 to 50 » | 2,107,929 | 51,189 | 295,789 | 2 903,195 | 1,407,785 | 6,765,887 |
| » 50 to 100 » | 857,797 | 19,620 | 121,948 | 1,161,734 | 250,732 | 2,411,831 |
| Over 100 ha | 947,109 | 27,219 | 159,531 | 2,056,488 | 415,447 | 3,605,794 |
| *Total* | *9,219,730* | *351,580* | *2,404,824* | *27,305,529* | *9,682,219* | *48,963,882* |

Details of crops grown on arable lands, for the whole of the Kingdom and for the different groups of holdings are given by table 5

We notice that large holdings have gone in for wheat growing much more than the small ones, and that they hare also left as follow a larger proportion of their land On the other hand rye and potato growing occupy a larger place in the average and small holdings. These characteristic differences come out clearly from the following ratios calculated in respect of the total of arable land for each class of holdings:

| Extent of arable land on holdings | Wheat | Rye | Potatoes | Fallow |
|---|---|---|---|---|
| | | (percentages) | | |
| Up to 0 25 ha | 0 3 | 0 6 | 38 4 | 0 1 |
| From 0 26 to 1 ha | 1 3 | 2 3 | 13 0 | 0 6 |
| » 1 to 2 » | 2 0 | 3 4 | 8 3 | 0 9 |
| » 2 to 5 » | 3 2 | 5 0 | 5 7 | 1 9 |
| » 5 to 10 » | 4 6 | 5 8 | 4 3 | 3 6 |
| » 10 to 20 » | 7 1 | 6 0 | 3 2 | 5 9 |
| » 20 to 30 » | 9 5 | 5 6 | 2 6 | 7 2 |
| » 30 to 50 » | 11 4 | 5 2 | 2 1 | 7 8 |
| » 50 to 100 » | 12 8 | 4 6 | 1 8 | 8 3 |
| Over 100 ha | 14 4 | 4 2 | 1 9 | 7 3 |
| *All holdings* | *8 0* | *5 3* | *3 5* | *5 6* |

"Other crops" include 393 acres under flax, 5,226 acres under crops for seed, 9,813 acres under vegetables, and 5,936 acres under unspecified crops. —

As for as horticulture proper is concerned, the census has considered, in addition to the acreage devoted to vegetable gardens and orchards, the area under vegetables, strawberries and nurseries in the open, and those in hothouses and under glass.—

## 5. — *Utilization of arable land.*

| Classification of holdings according to extent of arable land | Wheat | Rye | Barley | Oats | Meslin |
|---|---|---|---|---|---|
| | acres | acres | acres | acres | acres |
| Up to 0.25 ha | 35 | 67 | 57 | 825 | 363 |
| From 0.26 to 1 ha | 1,258 | 2 061 | 1,853 | 11,155 | 3,121 |
| » 1 to 2 » | 4 992 | 8,182 | 7,660 | 36,392 | 8 459 |
| » 2 to 5 » | 32,801 | 51,357 | 36,152 | 187 447 | 32,648 |
| » 5 to 10 » | 82,594 | 103,845 | 52,251 | 359,919 | 83 335 |
| » 10 to 20 » | 151,040 | 128,726 | 40 906 | 414,582 | 150,875 |
| » 20 to 50 » | 219,391 | 61,080 | 49,219 | 348,817 | 190,173 |
| » 50 to 100 » | 110,267 | 92,172 | 19 616 | 134,133 | 76,438 |
| Over 100 ha | 137,143 | 39,567 | 27,231 | 130,866 | 75,929 |
| *Total* | *739,521* | *487,057* | *234,945* | *1,624,136* | *621,341* |

| Classification of holdings according to extent of arable land | Peas | Beans | Vetches | Potatoes | Root Crops for fodder |
|---|---|---|---|---|---|
| | acres | acres | acres | acres | acres |
| Up to 0.25 ha | 0 | 2 | 2 | 4,475 | 84 |
| From 0.26 to 1 ha | 77 | 30 | 106 | 11,876 | 1,367 |
| » 1 to 2 » | 116 | 57 | 277 | 20,401 | 3,699 |
| » 2 to 5 » | 801 | 403 | 986 | 58,567 | 16,949 |
| » 5 to 10 » | 3,015 | 759 | 1,799 | 76 811 | 35 386 |
| » 10 to 20 » | 7,989 | 390 | 2,197 | 68,595 | 46,185 |
| » 20 to 50 » | 15,612 | 262 | 2,768 | 49,318 | 43,032 |
| » 50 to 100 | 8,864 | 86 | 1,179 | 15,541 | 14,140 |
| Over 100 ha | 10,040 | 67 | 1,048 | 17,948 | 18,615 |
| *Total* | *46,514* | *2,056* | *10,362* | *323 532* | *179,457* |

| Classification of holdings according to extent of arable land | Cereals for green fodder | Meadows for hay | Meadows for seed | Meadows for pasture | Luzerne |
|---|---|---|---|---|---|
| | acres | acres | acres | acres | acres |
| Up to 0.25 ha | 136 | 4,814 | 2 | 74 | — |
| From 0.26 to 1 ha | 4 211 | 49,180 | 57 | 1 757 | 116 |
| » 1 to 2 » | 9,815 | 133,323 | 230 | 4 616 | 247 |
| » 2 to 5 » | 30,997 | 516,618 | 2,073 | 21,185 | 638 |
| » 5 to 10 » | 47 969 | 796,385 | 7,381 | 56,833 | 1,369 |
| » 10 to 20 » | 56,435 | 777,902 | 13,290 | 102 938 | 2,866 |
| » 20 to 50 » | 52,740 | 647,265 | 21,736 | 122,158 | 4,730 |
| » 50 to 100 » | 16,082 | 251,668 | 14,678 | 54,040 | 1,745 |
| Over 100 ha | 16,766 | 266,403 | 19,695 | 79,048 | 3,089 |
| *Total* | *235,151* | *3,443,558* | *79,142* | *442,649* | *14,800* |

| Classification of holdings according to extent of arable land | Sugar beet | Other crops | Fallow Land | Arable land temporarily not cultivated | Total arable land |
|---|---|---|---|---|---|
| | acres | acres | acres | acres | acres |
| Up to 0.25 ha | 267 | 119 | 12 | 331 | *11,666* |
| From 0.26 to 1 ha | 722 | 561 | 502 | 1 497 | *91,504* |
| » 1 to 2 » | 1 505 | 823 | 2,241 | 2,382 | *245,416* |
| » 2 to 5 » | 3,618 | 2,333 | 19,527 | 7,134 | *1,022,233* |
| » 5 to 10 » | 10,828 | 3,136 | 65,575 | 11,424 | *1,800,614* |
| » 10 to 20 » | 25,376 | 3,568 | 127,311 | 14,290 | *2,135,462* |
| » 20 to 50 » | 50,074 | 4,188 | 157,216 | 15,247 | *2,107,929* |
| » 50 to 100 » | 19,225 | 2,404 | 71,429 | 6,993 | *857,797* |
| Over 100 ha. | 24,731 | 4,235 | 69,383 | 5,305 | *947,109* |
| *Total* | *136,346* | *21,367* | *513,196* | *64,603* | *9,219,730* |

The results for the whole country were as follows

| | acres |
|---|---|
| Area of vegetables in the open | 26,630 7 |
| strawberries | 2 854 9 |
| nurseries etc | 1 949 2 |
| hothouses | 492 0 |
| under glass | 459 4 |

The census has also considered the number of fruit trees and of gooseberry and raspberry bushes giving the following figures —

| | Number |
|---|---|
| Apple trees over 5 years | 4 480 516 |
| Pear trees | 1 229 624 |
| Plum trees | 1 071 01[illegible] |
| Cherry trees | 1 077 610 |
| Fruit trees of all kinds under five years | 1 504 5[illegible]8 |
| Gooseberry bushes | 4 509 966 |
| Raspberry bushes | 8 134 [illegible]04 |

With regards to meadows and pastures the permanent meadows for hay the rotation meadows and the other pastures have been separately classified The distribution of the area of meadows and pastures among these those classes is given for holdings divided according to the extent of their arable land by Table 6

6 *Permanent meadows and pastures in holdings*

| Classification of holdings to extent of arable land | Permanent meadows for hay | Cultivated pastures | Other pastures | Total area of permanent meadows and pastures |
|---|---|---|---|---|
| | acres | acres | acres | acres |
| Up to 0.25 ha | 3 148 | 499 | 2 466 | *6 113* |
| From more to 1 ha | 52 696 | 1 621 | 35 638 | *89 955* |
| 1 to 2 | 98 152 | 4 611 | 74 743 | *177 506* |
| » 2 to 5 » | 263 389 | 29 183 | 267 216 | *559 788* |
| » 5 to 10 » | 192 908 | 48 881 | 347 005 | *588 794* |
| » 10 to 20 » | 84 862 | 38 243 | 282 295 | *405 400* |
| » 20 to 50 | 39 967 | 43 679 | 212 143 | *295 789* |
| » 50 to 100 | 12 323 | 26 149 | 83 476 | *121 948* |
| Over 100 ha | 17 219 | 46 891 | 95 421 | *159 531* |
| *Total* | *764 664* | *239,757* | *1 400 403* | *2 404 824* |

In respect of woods and forests which occupy 54 5 per cent of the total area of the country the census has enabled to ascertain the distribution of the wooded area according to its owners and according to the extent belonging to each owner, as indicated by Table 7 Table 8 indicates the distribution of woods in estates belonging to private owners, according to the extent of the woods and the extent of arable land of each holdings

### 7. — *Area of forests according to property and extent.*

| Classification | Area of forests: up to 25 ha | from 25 to 100 ha | from 100 to 400 ha | over 400 ha | Total area of forests |
|---|---|---|---|---|---|
| | acres | acres | acres | acres | acres |
| Forests of State | 20,532 | 57 912 | 235,431 | 10,161,201 | *10,475 076* |
| Forest of other public bodiest | 55,488 | 230,486 | 617,699 | 2,323,863 | *3,227,536* |
| Forests of societies | 33,651 | 135 176 | 631,070 | 13,179,316 | *13,979,213* |
| Forests of private persons | 4,455 138 | 10 959,192 | 8,655 077 | 3,492,535 | *27,561,932* |
| in small holdings (1) | (9,946) | (9,534) | (17 952) | (12,039) | *(49,471)* |
| in holdings (2) | (4 184,860) | (9,816,334) | (7,183,585) | (2,387,234) | *(23 572 013)* |
| in out lying land | (260 332) | (1,133,314) | (1,453 540) | (1,093 262) | *(3 940,448)* |
| *Total* | *4 564 809* | *11 382,756* | *10,139,277* | *29,156 915* | *55 243,757* |

(1) Holdings with not more than 0.25 ha of arable land — (2) Holdings with more than 0.25 ha of arable land

### 8. — *Area of forests in holdings of private persons according to forest extent*

| Classification of holdings according to extent of arable land | Number of holdings: without forests | with forests | Area of forests: up to 25 ha | from 25 to 100 ha | from 100 to 400 ha | Over 400 ha | Total area of forests |
|---|---|---|---|---|---|---|---|
| | | | acres | acres | acres | acres | acres |
| From 0 6 to 1 ha | 15,198 | 12 610 | 167,456 | 224,899 | 214 592 | 48 288 | *655 235* |
| » 1 to » | 21 025 | 27 419 | 421,472 | 531 687 | 545,950 | 112,652 | *1 611 961* |
| » 2 to 5 | 24,712 | 78 801 | 1 417 981 | 2,440,159 | 1,971,913 | 380,528 | *6,210 581* |
| » 5 to 10 | 17 171 | 74 566 | 1,218,509 | 3,452 184 | 1 960,113 | 431,761 | *7,062 567* |
| » 10 to 20 | 14 140 | 42 527 | 677,481 | 2,017,143 | 1,236,511 | 313 752 | *4 244,887* |
| » 20 to 50 » | 7,897 | 17 170 | 253,645 | 909 272 | 623,340 | 220 965 | *2,007,222* |
| » 50 to 100 » | 1 197 | 2 765 | 22,519 | 186 110 | 310,559 | 181,168 | *700,356* |
| Over 100 ha | 491 | 1 346 | 5 797 | 54,680 | 320,607 | 698,120 | *1,079,204* |
| *Total* | *101,631* | *257,224* | *4 184,860* | *9,816,334* | *7,183,585* | *2,387,234* | *23,572,013* |

Table 9 shows the number of holdings, classified according to the extent of arable land, which have stated to possess livestock of any kind including rabbits and poultry.

Even if no account is taken of the smallest holdings (up to 1/4 hectare fo arable land) it appears that 5.0 per cent. of the holdings do not possess any Kind of livestock; that 36 2 per cent. have no horses; 9 5 per cent. no cattle; 84.9 per cent. no sheep; 96 9 per cent. no goats; 27.8 per cent. no pigs; 07 4 per cent. no rabbits, and 30.6 per cent. no poultry.

Tables 10 to 13 give the details furnished by the census in respect of the composition of livestock of various Kinds, and its distribution amongst holdings classified according to the arable land at their disposal.

### 9 — *Distribution of holdings according to kind of livestock*

| Classification of holdings according to extent of arable land | Total number of holdings | Number of holdings with livestock | with horses | with cattle | with pigs |
|---|---|---|---|---|---|
| Up to 0 25 ha | 289 114 | 76 413 | 2 298 | 10 553 | 27 042 |
| From 0 26 to 1 ha | 52 335 | 38 268 | 2 635 | 29 655 | 17 517 |
| » 1 to 2 | 58 990 | 53 437 | 9 140 | 50 639 | 30 929 |
| » 2 to 5 | 113 722 | 110 235 | 69 825 | 108 149 | 81 077 |
| 5 to 10 » | 97 298 | 96 188 | 90 602 | 95 322 | 83 351 |
| » 10 to 20 » | 60 441 | 60 068 | 59 233 | 59 790 | 55 906 |
| » 20 to 50 » | 28 487 | 28 312 | 28 222 | 28 176 | 26 899 |
| » 50 to 100 » | 5 077 | 5 041 | 5 026 | 5 002 | 4 535 |
| Over 100 ha | 2 294 | 2 263 | 2 259 | 2 250 | 1 894 |
| *Total* | *707 758* | *470 225* | *269 240* | *389 536* | *329 150* |

| Classification of holdings according to extent of arable land | Number of holdings with sheep | with goats | with rabbits | with poultry | Keeping bees |
|---|---|---|---|---|---|
| Up to 0 25 ha | 870 | 751 | 4 778 | 58 638 | 9 717 |
| From 0 26 to 1 ha | 2 245 | 1 603 | 1 173 | 22 300 | 2 587 |
| » 1 to 2 » | 4 513 | 2 278 | 1 149 | 31,379 | 3 448 |
| » 2 to 5 » | 17 102 | 4 667 | 2 562 | 74 361 | 9 422 |
| » 5 to 10 » | 19 294 | 3 396 | 2 615 | 75 961 | 10 341 |
| » 10 to 20 | 12 655 | 797 | 1 915 | 53 515 | 7 256 |
| » 20 to 50 » | 5 915 | 216 | 969 | 26 399 | 3 475 |
| » 50 to 100 » | 867 | 65 | 226 | 4 592 | 723 |
| Over 100 ha | 455 | 57 | 251 | 1 980 | 589 |
| *Total* | *63 916* | *13 830* | *15 638* | *349 125* | *47 558* |

We may add that of the 310 633 horses between 4 and 15 years existing in all holdings, 10,729 were warm blood ones 136 435 cold blood light draught and 163 469 cold blood heavy drought horses

### 10 — *Number of horses on holdings*

| Classification of holdings according to extent of arable land | Colt and fillies | Young horses 1 to 2 years old | Geldings and mares 3 years old | Geldings and mares 4 to 15 years old | Geldings and mares 16 years old and over | Stallions 3 years old and over | Total |
|---|---|---|---|---|---|---|---|
| Up to 0 25 ha | 149 | 112 | 153 | 7,972 | 1,286 | 155 | *9 827* |
| From 0 26 to 1 ha | 38 | 72 | 73 | 1 777 | 916 | 10 | *2 886* |
| » 1 to 2 » | 184 | 298 | 299 | 5,903 | 3 530 | 23 | *10 237* |
| » 2 to 5 » | 2 498 | 3 364 | 2 216 | 40 919 | 30 927 | 150 | *80 074* |
| » 5 to 10 » | 8,813 | 12 019 | 7 079 | 70,604 | 49 894 | 313 | *148,722* |
| » 10 to 20 » | 13,585 | 19 441 | 10 499 | 75 851 | 42 705 | 525 | *162 606* |
| » 20 to 50 » | 13,260 | 20 246 | 9 739 | 65 590 | 27 770 | 662 | *137,767* |
| » 50 to 100 » | 3 686 | 6 627 | 2 918 | 20 981 | 7 062 | 401 | *41 675* |
| Over 100 ha | 3 126 | 6,085 | 2 557 | 21,036 | 6 273 | 405 | *39,482* |
| *Total* | *45,339* | *68 764* | *35,533* | *310,633* | *170 363* | *2,644* | *633,276* |

## 11 — *Number of cattle on holdings*

| Classification of holdings according to extent of arable land | Calves | Heifers | Young bulls and oxen | Cows | Bulls | Oxen | Total |
|---|---|---|---|---|---|---|---|
| Up to 0.25 ha | 1 411 | 1 138 | 65 | 14 465 | 4 | 4 | *17 087* |
| From 0.26 to 1 ha | 7 130 | 4 478 | 285 | 44 095 | 19 | 32 | *56 039* |
| » 1 to 2 » | 18 317 | 12 544 | 964 | 99 946 | 63 | 247 | *132 081* |
| » 2 to 5 » | 66 615 | 54 325 | 4 823 | 327 590 | 426 | 2 791 | *456 570* |
| » 5 to 10 » | 99 303 | 94 671 | 10 713 | 451 606 | 1 675 | 3 312 | *661 280* |
| » 10 to 20 » | 105 585 | 112 032 | 16 125 | 422 228 | 5 302 | 1 381 | *662 653* |
| » 20 to 50 » | 94 361 | 115 195 | 16 479 | 326 724 | 11 269 | 664 | *564 692* |
| » 50 to 100 » | 33 793 | 49 278 | 4 405 | 113 229 | 4 558 | 238 | *205 501* |
| Over 100 ha | 39 050 | 61 178 | 4 377 | 121 513 | 3 956 | 290 | *230 364* |
| *Total* | *465 565* | *504 839* | *58 236* | *1 921 396* | *27 272* | *8 959* | *2 986 267* |

## 12 — *Number of sheep and goats on holdings*

| Classification of holdings according to extent of arable land | Sheep | | | | Goats | | |
|---|---|---|---|---|---|---|---|
| | Lambs | Wethers | Ewes and rams | Total | Kids | Adult goats | Total |
| Up to 0.25 ha | 1 132 | 181 | 2 336 | *3 649* | 298 | 1 338 | *1 636* |
| From 0.26 to 1 ha | 2 297 | 541 | 4 480 | *7 318* | 689 | 3 731 | *4 420* |
| » 1 to 2 » | 5 124 | 1 385 | 9 710 | *16 219* | 1 062 | 5 754 | *6 816* |
| » 2 to 5 » | 23 857 | 5 191 | 41 242 | *70,290* | 2 507 | 13 612 | *16 119* |
| » 5 to 10 » | 34 729 | 5 902 | 54 903 | *95 534* | 1 342 | 7 799 | *9 141* |
| » 10 to 20 » | 29 760 | 4 228 | 43 300 | *77 288* | 441 | 2 086 | *2 527* |
| » 20 to 50 » | 20 139 | 2 312 | 26 677 | *49 128* | 85 | 353 | *438* |
| » 50 to 100 » | 5 076 | 564 | 7 593 | *13 233* | 19 | 74 | *93* |
| Over 100 ha | 8 195 | 568 | 11 902 | *20 665* | 12 | 70 | *82* |
| *Total* | *130 309* | *20 872* | *202 143* | *353 324* | *6 455* | *34 817* | *41 272* |

## 13 — *Number of pigs and rabbits on holdings*

| Classification of holdings according to extent of arable land | Pigs | | | | | Rabbits over 7 months old |
|---|---|---|---|---|---|---|
| | Sucking pigs under 3 months old | Sows | Boars | Other pigs | Total | |
| Up to 0.25 ha | 14 952 | 502 | 91 | 36 951 | *52 496* | 23 719 |
| From 0.26 to 1 ha | 8 335 | 469 | 81 | 18 848 | *27 733* | 6 206 |
| » 1 to 2 » | 17 022 | 1 012 | 165 | 30 991 | *49 190* | 5 941 |
| » 2 to 5 » | 69 831 | 9 263 | 609 | 96 786 | *176 489* | 13 782 |
| » 5 to 10 » | 130 193 | 28 589 | 1 146 | 145 142 | *305 070* | 12 027 |
| » 10 to 20 » | 157 526 | 41 609 | 1 715 | 154 249 | *355 099* | 9 503 |
| » 20 to 50 » | 124 004 | 35 035 | 2 714 | 127 409 | *289 162* | 6 674 |
| » 50 to 100 » | 30 482 | 8 231 | 940 | 37 314 | *76 967* | 2 373 |
| Over 100 ha | 33,915 | 7 958 | 1 132 | 49 724 | *92 729* | 3,459 |
| *Total* | *586,260* | *132,668* | *8,593* | *697,414* | *1 424,935* | *83 684* |

As a rule, we may notice that in the case of nearly all Kinds of livestock, the number is relatively greater in smaller than in larger holdings. The number of animals per 100 hectares of arable land is as follows.--

| Extent of arable land on holdings | Hores | Cattle | Pigs | Sheep | Goats | Rabbits over mouths | Poultry |
|---|---|---|---|---|---|---|---|
| From 0.20 to 1 ha. . . | 7.1 | 138.4 | 65.5 | 18.1 | 10.0 | 15.3 | 934.0 |
| » 1 to 2 » . . | 0.6 | 123.1 | 45.9 | 15.1 | 6.4 | 5.3 | 480.3 |
| 2 to 5 . . | 18.1 | 103.2 | 39.9 | 15.9 | 3.6 | 3.1 | 304.3 |
| » 5 to 10 » . . | 19.4 | 80.3 | 39.8 | 12.5 | 1.2 | 1.6 | 322.6 |
| » 10 to 20 » . . | 18.2 | 71.0 | 30.6 | 8.6 | 0.3 | 1.1 | 180.7 |
| » 20 to 30 » . . | 16.6 | 66.4 | 35.2 | 6.2 | 0.1 | 0.9 | 133.9 |
| 30 to 50 » . | 14.5 | 61.8 | 30.4 | 4.9 | 0.0 | 0.6 | 99.9 |
| » 50 to 100 » . | 11.6 | 57.2 | 21.4 | 3.7 | 0.0 | 0.7 | 64.0 |
| Over 100 ha . . . | [illegible] | 57.3 | 23.1 | 5.1 | 0.0 | 0.0 | 54.3 |
| *All holdings* . . . | *16.2* | *76.5* | *36.5* | *9.0* | *1.1* | *2.1* | *207.7* |

From the tables we can see that, in the case both of horses and of cattle it is chiefly the average and large holdings which breed young animals, while the small holdings usually buy elsewhere the young animals and devote themselves chiefly to milk production.

The 1937 census has not collected any data concerning animal products but the Central Bureau of Statistics carried out in July, 1938, a special inquiry in this respect, in conformity with the recommendation contained in the programme formulated by the International Institute of Agriculture for the World Agricultural Census.

The basic data have been obtained by a representative census covering one tenth of the holdings having more that two hectares, selected from all parts of the country, excepting certain territories of the Norrland, which are of small importance from an agricultural point of view. These data are referred to the twelve months from July 1, 1937 to June 30, 1938.

Taking into account the data concerning slaughtered animals of various Kinds, their average weight, the milk production per cow, the egg production per hen, etc. and of the number of animals in each district, obtained from the 1937 census, it has been possible to proceed to an estimate of animal production in respect of the whole Kingdom (1).

Total production of meat has been estimated at 235,553 long tons, of which 5,681 horse meat; 100,370 beef; 2,709 mutton, and 126,733 pork and bacon.-- The average production of meat per acre of arable land was 57.2 pounds this production was in inverse proportion to the acreage of arable land of the farms. The number of pigs under 6 months, sold by the farms for purposes other than slaughtering, was 1,200,694.

(1) See Statistiska Meddelanden, Ser. A. Bond V: 8; Den Animaliska Produktionen År 1937/38.

14. — *Number of poultry and beehives on holdings.*

| CLASSIFICATION OF HOLDINGS ACCORDING TO EXTENT OF ARABLE LAND. | Fowls | Chickens | Ducks | Geese | Turkey | Total poultry | Beehives |
|---|---|---|---|---|---|---|---|
| Up to 0.25 ha . | 989 259 | 319,568 | 9,651 | 3,619 | 3,055 | *1,325,152* | 43,815 |
| From 0.26 to 1 ha. . | 378,312 | 124,685 | 2,367 | 1,490 | 1,110 | *507,964* | 9,778 |
| » 1 to 2 » | 514,210 | 169,384 | 3,570 | 2,113 | 1,315 | *690,592* | 11,486 |
| » 2 to 5 » | 1,345,892 | 428,549 | 8,383 | 6,420 | 4,330 | *1,793,574* | 27,237 |
| » 5 to 10 » . | 1,781,945 | 610,519 | 14,888 | 14,863 | 6,221 | *2,428 436* | 30,130 |
| » 10 to 20 » | 1,618,587 | 604,920 | 22,786 | 22,449 | 8,721 | *2,277,463* | 22,077 |
| » 20 to 50 » | 1,031,911 | 436,057 | 22,650 | 20,511 | 7,457 | *1,518,586* | 11,123 |
| » 50 to 100 » | 230,089 | 92,924 | 6 320 | 4,729 | 2,630 | *336,692* | 2,822 |
| Over 100 ha | 218,446 | 84,363 | 5,364 | 2,893 | 2,214 | *313,280* | 3,645 |
| *Total* | *8,108,651* | *2,870 969* | *95,979* | *79,087* | *37,053* | *11,191,739* | *162,113* |

Total production of milk has been estimated at 4,787,149 long tons, giving an average of 5,580 lbs per cow — The average production per acre of arable land was 1,163 lbs, and was considerably higher in the smaller than in the larger holdings The quantity of milk sold during the year by the holdings has been extimated at 3,472,258 long tons, equal to 13 per cent, of total production — About 81 per cent. of the quantity sold was delivered to dairies. The quantity of farm butter sold has been estimated at 9,448 long tons, equel to about 13 per cent of the production of the dairies during the same period

Total egg production has been estimated at 802,760,000 eggs, equivalent to 46,615 long tons, giving an average of 112 eggs per hen. The average production per acre of arable land was therefore about 12 lbs. The number of eggs sold has been estimated at 566,220,000, i. e. 71 per cent. of total production.—

The 1937 agricultural census has also collected data and information in respect of drainage of arable land, of new land cleared since 1933, and of installations for the preservation of animal manure This information is summarized

15. — *Arable land equipped with drainage plants and land cleared*

| CLASSIFICATION OF HOLDINGS ACCORDING TO EXTENT OF ARABLE LAND | Total area of arable land | Arable land | | | | Arable land drained since 1933 | Land cleared since 1933 |
|---|---|---|---|---|---|---|---|
| | | with pipe drainage | with stone drainage | otherwise drained | Total area drained | | |
| | acres | acres | acres | acres | acres | acres | acres |
| Up to 0.25 ha . . . . . . . | 11,666 | 7 | 2 | — | 9 | 2 | 22 |
| From 0 26 to 1 ha. . | 91,504 | 1,522 | 1,490 | 573 | 3,585 | 292 | 1,441 |
| » 1 to 2 » . . | 245,416 | 8,305 | 7,208 | 3,494 | 19,007 | 1,596 | 4,265 |
| » 2 to 5 » . . . . | 1,022,233 | 40,494 | 39,330 | 25,257 | 105,081 | 9,865 | 15,620 |
| » 5 to 10 » . . . . | 1,800,614 | 133,701 | 74,970 | 56,763 | 265,434 | 23,446 | 13,673 |
| » 10 to 20 » . | 2,135,462 | 345,196 | 95,307 | 75,749 | 516,252 | 41,957 | 6,593 |
| » 20 to 50 » . . | 2,107,929 | 624,630 | 85,070 | 78,917 | 788,617 | 58,701 | 4,016 |
| » 50 to 100 » | 857,797 | 323,901 | 28,848 | 42,619 | 395,368 | 30,721 | 1,130 |
| Over 100 ha. . . . . . . . | 947,109 | 472,769 | 26,619 | 42,312 | 541,700 | 34,963 | 1,870 |
| *Total . . .* | *9,219,730* | *1,950,525* | *358,844* | *325,684* | *2,635,053* | *201,543* | *48,810* |

16. — *Number of holdings provided with pits for keeping manure of animal origin*

| Classification of holdings according to extent of arable land | Number of holdings with | | |
|---|---|---|---|
| | pits with cemented floors | pits otherwise made impermeable | cemented trenches for liquid manure |
| Up to 0.25 ha | 93 | 11 | 27 |
| From 0.26 to 1 ha | 3,220 | 466 | 766 |
| » 1 to 2 | 8,763 | 1,249 | 2,661 |
| » 2 to 5 | 27,225 | 3,143 | 9 082 |
| » 5 to 10 | 28,445 | 3,799 | 12,504 |
| » 10 to 20 | 16,849 | 3 597 | 10,640 |
| » 20 to 50 | 7,678 | 2,926 | 6,566 |
| » 50 to 100 » | 1 612 | 725 | 1,683 |
| Over 100 ha | 954 | 611 | 1,204 |
| *Total* | *94,839* | *16,577* | *45,133* |

in tables 15 and 16. — Altogether, 28,6 per cent of the country's arable land was drained, mostly (21,3 per cent) by means of tubular drains. — Drainage was chiefly practized in the plains of Southern and Central Sweden, while it was only rarely found in the forest districts and in the province of Norrland The proportion of drained arable land was usually low in small holdings and increased with the size of the holding

The land cleared during the period from 1933 to 1937 was chiefly in the northern part of the province of Norrland, where there are still great possibilities of winning new land for agricultural purposes

Concerning the installations for the preservation of manure of animal origin, 24,3 per cent of the holdings had a concrete bottomed manure heap, 4.2 per cent. a manure heap made watertight by some other means, and 11.6 per cent. a concrete ditch for liquid manure These installations were much more frequent in the large than in the small holdings

Prof. Ugo Papi, *Segretario generale dell'Istituto, Direttore responsabile.*

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# MONTHLY CROP REPORT AND AGRICULTURAL STATISTICS

*The following explanations refer to crop conditions quoted in the crop notes and in the tables. — Crop condition according to the system of the country : Germany, Bohemia and Moravia (Protectorate); Hungary :* 1 = *excellent,* 2 = *good,* 3 = *average,* 4 = *poor,* 5 = *very poor; Finland :* 8 = *very good,* 6 = *above the average,* 5 = *average; France :* 100 = *excellent,* 70 = *good,* 60 = *fairly good,* 50 = *average,* 30 = *poor; Romania and Sweden :* 5 = *excellent,* 4 = *good,* 3 = *average,* 2 = *poor,* 1 = *very poor; Netherlands :* 90 = *excellent,* 70 = *good,* 60 = *fairly good,* 50 = *below awerage; Portugal :* 100 = *excellent,* 80 = *good,* 60 = *average,* 40 = *poor,* 20 = *very poor; Switzerland :* 100 = *excellent,* 90 = *very good,* 75 = *good,* 60 = *fairly good,* 50 = *average,* 40 = *rather poor,* 30 = *poor,* 10 = *very poor, U. S. S. R. :* 5 = *good,* 4 = *above the average,* 3 = *average,* 2 = *below average,* 1 = *poor; Canada :* 100 = *crop condition promising a yield equivalent to the average yield of a long series of years; United States :* 100 = *crop condition which promises a normal yield; Egypt :* 100 = *crop condition which promises a yield equal to the average yield of the last five years. — For other countries the system of the Institute is employed :* 100 = *crop condition which promises a yield equal to the average of the last ten years.*

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NOTE. *The countries are listed throughout by continents (Europe, followed by the U. S. S. R., America, Asia, Africa and Oceania) in the French alphabetical order. In the tables the Northern Hemisphere precedes the Southern Hemisphere.*

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***See latest information at page 432.***

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## *VEGETAL PRODUCTION*

### CURRENT INFORMATION FROM VARIOUS COUNTRIES ON WHEAT, RYE, BARLEY AND OATS.

*Belgium.* Early autumn harvest was in full swing and, on the whole, prospects were satisfactory, though less favourable with regard to oats, which suffered from cold weather and drought. Yields will be regular. Steady rains during the first week of August hampered the harvesting. It is however to be hoped that these rains will not cause too great a damage since the crop estimates have been most favourable. The threshing of winter barley has been started. The results are satisfactory.

*Bulgaria.* The wheat and rye crops are big enough and of a good quality; those of barley and oats, excellent.

Bulgarian agriculture has increased its crops of different varieties of wheat following the annexation of Macedonia and the coast of the Egean sea. In order to avoid doubtful results the Ministry for Agriculture ordered the seeds of autumn wheat to be distributed among the annexed territories, for which purpose the different kinds of seeds previously sown in those districts were used. At the same time experimental institutes have been entrusted with the study of wheat seeds most suitable for the soil and the territories above mentioned.

*Croatia:* The threshing of cereals was progressing in the middle of August and crop prospects were very satisfactory.

The quality of wheat, rye and barley is satisfactory. As far as wheat is concerned a crop of about 14,500,000 centals (24,250,000 bushels) is foreseen on a cultivated area of 1,580,000 acres.

*Denmark:* The drought and the great heat have caused an early maturation of the cereals hindering a regular development of the grains. The rains which fell in the second half of July were too late to bring about a substantial improvement. A decrease in the output of straw is expected as well. At the end of July, harvest had begun in most parts of the country. The condition of the crops was, according to the system of the Institute, the following one on August 1st 1941, as compared with July 1st 1941 and August 1st 1940:

| | August 1, 1941 | July 1, 1941 | August 1, 1940 |
|---|---|---|---|
| Wheat | 75 | 74 | 67 |
| Rye | 83 | 90 | 86 |
| Barley | 82 | 88 | 86 |
| Oats | 79 | 86 | 84 |
| Meslin | 79 | 86 | 82 |

*Spain:* According to information given in the press, the maturation of cereals was delayed by unfavourable spring weather. As to wheat, the results obtained in most provinces are more than was expected, but not above the average. The stocking of the produce is actively going on, being favoured by good weather As to barley, the output varies much from one province to another, and on the whole an average crop is expected.

*Finland:* The situation of cereal crops on July 1, 1941 as compared with that of June 1, 1941 and July 1, 1940 is stated below according to the system used in Finland:

| | July 1, 1941 | June 1, 1941 | July 1, 1940 |
|---|---|---|---|
| Winter wheat | 5.0 | 4.6 | 4.4 |
| Spring wheat | 5.0 | 4.7 | 4.8 |
| Rye | 5.8 | 5.5 | 4.6 |
| Barley | 4.9 | 4.7 | 4.6 |
| Oats | 5.0 | 4.7 | 4.7 |
| Meslin | 4.8 | 4.6 | 4.7 |

*France:* According to information issued by the Ministry of Agriculture prospects of cereal crops are satisfactory. The only difficulties encountered are connected with the shortage of string.

*Hungary:* According to an official report received by the Institute, the condition of the cereal crops on July 15 may be summed as follows. The first fortnight of July was characterised by weather which progressively heated the air and by many rainfalls. This variable weather was in general rather favourable to the crops, except in some regions where the rains proved excessive.

The harvest of *wheat* had begun in the Southern half of the country and in the plains, but work was hampered by frequent rains. In the North and East, crops were in lactescent maturation, while in the mountain regions late seeds were still green. Grains were as a rule swelling and of a good quality. An average wheat crop was foreseen on July 15.

The *rye* harvest had begun everywhere, except in the Northern and North-Eastern departments. In the South and in certain zones of the plains harvest work was ended. Ears were mostly big, but in some places transparent.

## *Area and Production of Cereals*

| COUNTRIES | AREA 1941 | AREA 1940 | AREA Aver. 1935 to 1939 | % 1941: 1940 = 100 | % 1941: Aver. = 100 | PRODUCTION 1941 (000 centals) | PRODUCTION 1940 (000 centals) | PRODUCTION Aver. 1935 to 1939 (000 centals) | PRODUCTION 1941 (000 bushels) | PRODUCTION 1940 (000 bushels) | PRODUCTION Aver. 1935 to 1939 (000 bushels) | % 1941: 1940 = 100 | % 1941: Aver. = 100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 000 acres | | | | | | | | | | | | |
| **WHEAT** | | | | | | | | | | | | | |
| Belgium | 426 | (a) 354 | 394 | — | 108.1 | | | 9 691 | | | 16 151 | | |
| Spain | 9 547 | 8 735 | (1) 8 639 | 109.3 | 110.5 | | 47 648 | 63 270 | | (2) 79 412 | (1) 105 448 | | |
| Ireland | 491 | 305 | 225 | 160.9 | 218.1 | | 7 011 | 4 613 | | 11 685 | 7 689 | | |
| Slovakia | 549 | 539 | | 101.8 | — | 6 834 | 6 393 | | 11 390 | 10 655 | | 106.9 | — |
| Sweden | (a) 569 | (a) 356 | (a) 567 | 106.2 | 100.3 | | 9 276 | 15 811 | | 15 459 | 26 351 | | |
| Canada (w) | 629 | 775 | 652 | 81.1 | 96.5 | 9 850 | 13 259 | 10 302 | 16 417 | 22 099 | 17 171 | 74.3 | 95.6 |
| Canada (s) | (2) 21 776 | 27 951 | 24 913 | 77.9 | 87.3 | (3) 157 000 | 317 575 | 177 157 | (3) 261 000 | 529 291 | 295 229 | 49.4 | 88.5 |
| United States (w) | 40 316 | 36 147 | 41 186 | 111.5 | 97.9 | 570 572 | 353 491 | 351 467 | 950 953 | 589 151 | 585 778 | 116.4 | 124.7 |
| United States (s) | 16 467 | 17 351 | 16 387 | 94.9 | 100.5 | | 136 528 | 105 961 | | 227 547 | 176 606 | | |
| India | 34 499 | 33 673 | 34 262 | 102.5 | 100.7 | 223 306 | 238 358 | 220 922 | 372 176 | 397 264 | 368 204 | 93.7 | 101.1 |
| Japan | 1 987 | 2 024 | 1 738 | 98.1 | 111.1 | 35 705 | 39 682 | 30 078 | 59 507 | 66 135 | 50 130 | 90.0 | 118.7 |
| Syria and Lebanon | 1 600 | | 1 363 | | 117.4 | 16 560 | 14 760 | 11 692 | 27 600 | 24 600 | 19 486 | 112.2 | 141.6 |
| Algeria | | | 4 176 | | | 19 200 | 16 560 | 20 890 | 32 000 | 27 600 | 34 816 | 115.9 | 91.9 |
| Egypt | 1 [illegible]61 | 1 563 | 1 464 | 99.9 | 106.7 | 24 918 | 29 297 | 27 510 | 41 529 | 49 991 | 45 848 | 83.1 | 90.6 |
| **RYE** | | | | | | | | | | | | | |
| Belgium | (a) 298 | (a) 280 | (a) 369 | 106.3 | 80.8 | | | 7 790 | | | 13 910 | | |
| Spain | 1 144 | 1 301 | (1) 1 302 | 106.1 | 110.9 | | 7 740 | (1) 9 041 | | 13 811 | (1) 16 144 | | |
| Slovakia | 376 | 373 | | 100.7 | | 4 189 | 4 409 | | 7 480 | 7 874 | | 95.0 | |
| Sweden | (a) 503 | (a) 408 | (a) 491 | 123 | 102.5 | | 5 862 | 8 304 | | 10 468 | 14 828 | | |
| Canada | (2) 1 100 | 1 035 | 816 | 106.3 | 135.0 | (3) 7 200 | 7 857 | 5 147 | (3) 12 900 | 13 994 | 9 191 | 92.5 | 140.8 |
| United States | 3 436 | 3 192 | 3 723 | 107.6 | 92.3 | 26 019 | 22 737 | 25 576 | 46 462 | 40 601 | 45 672 | 114.4 | 101.7 |
| **BARLEY** | | | | | | | | | | | | | |
| Belgium | (a) 49 | 57 | (a) 51 | | 76.2 | | | 1 757 | | | [illegible] | | |
| Spain | 3 773 | 3 859 | (1) 3 382 | 97.8 | 111.6 | | 30 769 | 31 262 | | 64 103 | 65 130 | | |
| Ireland | 169 | 132 | 118 | 128.0 | 142.9 | | 3 114 | 2 598 | | 6 487 | 5 413 | | |
| Slovakia | 479 | 499 | | 96.0 | — | 5 732 | 6 614 | — | 11 94[illegible] | 13 779 | | 86.7 | — |
| Canada | (2) 5 300 | [illegible]341 | 4 [illegible]91 | 135.9 | 137.5 | 49 800 | 50 043 | 42 663 | 103 800 | 104 256 | 88 882 | 99.6 | 116.8 |
| United States | 13 977 | 13 394 | 10 774 | 104.4 | 129.7 | 166 107 | 148 133 | 113 409 | 346 057 | 309 255 | 326 270 | 111.9 | 146.5 |
| Japan | | 1 848 | 1 892 | | | 58 675 | 37 198 | 35 112 | 80 574 | 77 498 | 73 [illegible] | 104.0 | 110.1 |
| Algeria | | | 3 036 | | | 15 360 | 7 920 | 15 415 | 32 000 | 16 500 | 32 114 | 193.9 | 99.6 |
| Egypt | 255 | 268 | 278 | 95.1 | 95.1 | 4 699 | 5 315 | 7 339 | 9 789 | 11 07[illegible] | 15 290 | 88.4 | [illegible] |
| **OATS** | | | | | | | | | | | | | |
| Spain | 1 535 | 1 597 | (1) 1 423 | 96.1 | 107.8 | | 10 459 | (1) 10 549 | | 32 685 | (1) 32 96[illegible] | | |
| Ireland | 776 | 691 | 571 | 114.0 | 136.0 | | 16 222 | 12 565 | | 50 694 | 39 265 | | |
| Canada | (2) 14 170 | 12 298 | 13 246 | 115.2 | 107.0 | (3) 108 000 | 129 379 | 114 944 | (3) 339 000 | 404 309 | 359 201 | 83.8 | 94.3 |
| United States | 37 236 | 34 847 | 35 417 | 106.9 | 105.1 | 367 412 | 595 401 | 529 369 | 1 148 672 | 1 235 628 | 1 029 273 | 92.9 | 111.6 |
| Algeria | | . | 470 | . | | 2 560 | . | 5 387 | 8 000 | | 10 585 | | 75.6 |

(w) Winter crop. — (s) Spring crop. — (1) Year 1939. — (2) Approximate estimate. — (3) Conjectural estimate based on crop condition on July 31 and long time average yields per acre.

At that time, most of the *autumn barley* had been harvested and its threshing was proceeding in several places. A harvest above the average, both as to quantity and quality, was expected.

*Spring barley* was maturing, and was sometimes already harvested. Early crops were thick and high while the late ones were low, thin and mixed with weeds. An average harvest was foreseen.

The condition of *oats* had somewhat improved owing to favourable weather. The ears were formed everywhere, and early crops were yellowing in the Southern regions. An average crop was expected

In the second half of July, weather was moderately hot while rains remained under the average Harvesting and threshing went on regularly. The harvest of wheat and winter rye was ended, safe in the mountain regions, and threshing was proceeding, the harvest of summer wheat had begun. The grains are full and of a good quality. The wheat crop is generally estimated a normal one, and the rye one rather poor.

At the end of July, the threshing of winter rye was ended, and that of summer barley was proceeding. Some cases of early maturation were reported while in some regions grains were discoloured by an excess of moisture A rather poor crop is foreseen The oats harvest had begun in the plains while maturation was still delayed in the hills, and even more so in the mountains. A better crop is expected, both as to quality and quantity, in the case of early crops than in that of late ones. Generally speaking the oats crop will be an average one.

*Italy* The compulsory storing of cereals is taking place this year at a speedy rate and considerably earlier than last year

*Norway*. Condition of cereal crops on August 1 was as follows winter wheat 91 spring wheat 96, winter rye 96, spring rye 100, barley 97, oats 96, meslin 101.

*Portugal* According to Press information weather conditions in July were favourable for the ripening of wheat and an abundant crop is anticipated. Wheat production in 1940 was instead very scarce since, according to the most recent official estimates, a yield of barely 6,286,000 centals (10,476,000 bushels) was secured as against 11,378,000 centals (18,962,000 bushels) in 1939 and as against an average of 10,309,000 centals (17,181,000 bushels) during the five preceding years, percentages 55 2 and 61.0 The poor crops secured in 1940 were exclusively due to the trend of the season which was most unfavourable to plantation, since the area cultivated (1,242,000 acres) showed an insignificant reduction as compared with 1939 and the average.

Oats in 1940 were also extremely scarce having reached barely 552,000 centals (1,725,000 bushels) as against 2,008,000 centals (6,276,000 bushels) during the preceding year and against 2,128,000 centals (6,648,000 bushels) which was the average of the five preceding years; percentages 27 5 and 25.9.

*Romania:* According to information from the Ministry for Agriculture a satisfactory output of cereals is foreseen.

About the end of July, rains fell in some parts. The wheat and rye harvest was finished or going on upon 75 per cent. of the area under these crops; it was practically ended, with good results, in the Danube plain The autumn barley harvest was finished, and that of spring barley done up to 50 per cent., while the oats harvest had just begun.

The yield per acre of autumn wheat is less than it used to be in the foregoing years, but one has to bear in mind that the area under this crop has substantially increased. The harvest of spring wheat is very good, and, according to information obtained, the output of this crop will be by some 50 per cent. larger than in 1940. Again, in the case of barley and rye, there is expected a much better output than last year.

*Serbia:* Towards the end of July and the beginning of August the wheat harvest in the Banat districts was in full swing. Prospects of cereal output are satisfactory. According to local non-official information cereals may yield about 13 to 15 centals per acre. The harvest is equally good as far as the quality is concerned.

*Sweden:* During the month of June and the first half of July, the temperature was above the normal level. The drought, which had prevailed in April and May, persisted in June. In the first half of July, rains were distributed in a very irregular manner being copious in certain regions and insufficient elsewhere.

The autumn wheat crops, which had already suffered serious damage by the end of May, got still worse in the following period. In the case of autumn rye, there was a slight improvement in some regions and a further deterioration in other ones, so that on the whole the situation remained unchanged.

Spring crops, which suffered from the long drought and from night frosts in June, are, generally speaking, thin and but little developped. In some cases, however, they have drawn some advantage from rainfalls in July.

The conditions of the cereal crops on July 15, as compared with the same time in 1940, was, according to the system of the Institute, as follows:

| Crops | July 15 1941 | July 15 1940 |
|---|---|---|
| Autumn wheat | 63 | 62 |
| Spring wheat | 81 | 81 |
| Winter rye | 93 | 88 |
| Spring rye | 80 | 80 |
| Barley | 96 | 92 |
| Oats | 97 | 94 |
| Mixed grains | 92 | 85 |

*Switzerland:* During the first fortnight of July, all crops suffered from drought. Serious damage was already to be noticed on permeable soils, while heavy and damp ones resisted better. Rains which fell in the second fortnight of the month were urgently needed in the dry parts of the country. Unfortunately, about the middle of July, there took place heavy falls of hail, which caused serious damage in vast regions, especially to cereals. From July 13th to July 15th more than 6,000 cases of such damage, covering 207 communes, were reported to the Swiss Hail Insurance Company. The damage done was rather serious as the cereals were nearing maturity.

On August 1, harvesting had begun. The condition of the cereals had not changed much since the previous month. Where hail has not destroyed the crops nor done them more or less serious damage, the aspect of the fields is a good one, and, if the harvest can be barned in a good condition, the returns are likely to be satisfactory. In some places, heavy rainfalls and violent winds have caused lodging. The first results of the threshing of autumn barley and rye have proved different.

Generally speaking, grains are likely to be rather small on light and half-heavy soils; on heavy ones, instead, the returns in grains and straw promise well in the case both of autumn and of spring cereals.

The following table shows the condition of the various crops, expressed in the form of index-numbers (basis a very good crop made equal to 100) —

| | August 1, 1941 | July 1, 1941 | August 1, 1940 |
|---|---|---|---|
| Winter wheat | 82 | 82 | 70 |
| Spring wheat | 80 | 77 | 79 |
| Winter rye | 81 | 82 | 71 |
| Spring rye | 77 | 77 | 75 |
| Winter barley | 80 | 81 | 72 |
| Spring barley | 75 | 76 | 79 |
| Oats | 82 | 82 | 85 |
| Meslin | 81 | 82 | 75 |
| Spelt | 83 | 82 | 76 |

*Argentina* The weather conditions in July were favourable to cereal cultivation

*Canada* The areas under grain crops in the Prairie Provinces, with comparisons, are as follows

| Year | Wheat | Rye | Barley | Oats |
|---|---|---|---|---|
| | (1,000 acres) | | | |
| 1941 | 21,551 | 992 | 4,882 | 9,308 |
| 1940 | 27,750 | 943 | 3,622 | 7,818 |
| Average 1935-39 | 24,698 | 738 | 3,553 | 8,695 |

The wheat acreage has so decreased by 22.3 per cent in comparison with last year area and by 12.7 per cent in comparison with the average. On the other hand, rye acreage has increased by 5.2 and 34.5 per cent respectively; barley by 34.8 and 37.4 per cent., and oats by 19.1 and 7.0 percent All the estimates are considerably larger than the figures concerning the intentions of the farmers before spring seedings. Data reported in the table at page 383 refer to all Canada and include also approximately the areas cultivated in the other provinces of the Dominion.

Weather conditions during July, characterized by excessive heat and lack of adequate current rainfall, have not been favourable to the progress of crops. The condition figures indicated by the end of the month shows that the prospects at July 31 were considerably worst in comparison with those at June 30, so that it is plain to forecast yields largely below those of 1940. Condition figures for all Canada on July 31, 1941, expressed in per cent. of the long time (1908-40) average yields per acre, are as follows

| | Condition in percent | | | |
|---|---|---|---|---|
| | 1941 | | | 1940 |
| | July 31 | June 30 | May 31 | July 31 |
| Spring wheat | 72 | 80 | 98 | 105 |
| Spring rye | 63 | 86 | 95 | 85 |
| Barley | 73 | 89 | 93 | 84 |
| Oats | 72 | 87 | 94 | 88 |
| Mixed grains | 84 | 84 | 94 | 97 |
| Buckwheat | 86 | 85 | — | 95 |

The approximate forecasts of production calculated on the basis of these condition figures, appear in the table at page 383 As concerns wheat, they show a decrease of about 50 per cent. in comparison with the bumper crop of 1940 and one of 11 percent in comparison with the average.

*United States:* During the last week of July, high temperatures and only scanty rains were general in the interior of the country. Harvesting and threshing of winter wheat crop advanced despite heat, but the spring wheat crop was being forced too rapidly by high temperatures, following delayed ripening During the first week of August, persistently high temperatures, with only scattered showers, resulted in drought conditions in some sections and the interior of the country generally needed rain. In the North-West wheat harvest and threshing was generally well advanced.

Drought was becoming gradually more intense in the interior, during the second week of August, and the country needed rains in general, except the Southern States (Cotton belt) Ploughing was retarded by drought conditions in many dry sections, but most of the farm works progressed well Weather has been generally favourable for harvesting of small grains

During the week ending August 20, lower temperatures with good showers over a considerable area resulted in more favourable weather conditions for standing crops. However, heavy general rains were needed Harvesting of late grains was well advanced with good yields reported in North Dakota and winter wheat seeding progressing favourably in Kansas

*Turkey* According to information given by the Department of Agriculture, the outlook for the coming harvest of cereals is, generally speaking, good In the Hatay (Alexandrette) and Adana regions, a very big harvest is expected owing to heavy rainfalls

## CURRENT INFORMATION ON MAIZE.

*Bulgaria:* The maize crops have developped very well

*Hungary:* Early sowings had already grown up in different places by July 15. The ears were in progress; at times even a third weeding was carried out. In the second fortnight of July the somewhat damp weather was beneficial to the growth of maize which developed quite well. The leaves were of a beautiful fresh colour and a normal crop was anticipated.

*Portugal:* According to the most recent estimate area cultivated to maize in 1940 was about 974,000 acres against 977,000 in 1939 and 1,014,000 on the average of the five years ending 1938; percentages 99.8 and 96.1. The corresponding production is estimated at about 8,110,000 centals (14,482,000 bushels) against 8,011,000 (14,359,000) and 6,496,000 (11,600,000); percentages 100.9 and 124.9.

*Romania:* About the end of July, the second, and in some cases the third, weeding of maize was going on. The condition of the vegetation was satisfactory, and a good crop was expected.

*Switzerland:* Crop condition, according to the country's own system, were estimated at 78 at the beginning of August as against 63 on July 1, 1941 and 75 on August 1940.

*Canada:* According to the Dominion Bureau of Statistics, crop condition of maize for husking on July 31, 1941, in per cent. of long-time (1908-1940) average yield per acre was 96, compared with 89 a month before and 83 on July 31, 1940.

*United States:* During the first half of August, weather conditions were unfavourable for maize. The crop was suffering and somewhat damaged, with prospects generally reduced.

During the week ending August 20, weather has become favourable fo maize and deterioration was checked in some areas, but there was no general relief

A 1941 maize crop of 1,449,041,000 centals (2,587,574,000 bushels) is indicated by August 1 prospects, an increase of 21,764,000 centals (38,865,000 bushels) from the estimate of July 1, 1,427,277,000 centals (2,548,709,000 bushels). Such a production would be about 77,500,000 centals (138,400,000 bushels) or 5 6 per cent. larger than the 1940 crop of 1,371,552,000 centals (2,449,200,000 bushels) and about 146,900,000 centals (262,300,000 bushels) or 11 3 per cent. greater than the 5-year (1935-39) average production of 1,302,162,000 centals (2,325,290,000 bushels). The indicated yield per acre is the highest since 1920 The acreage for harvest, estimated at 85,943,000 acres, is the smallest in 47 years, and about a fourth less than that of 1932.

*Turkey:* According to information supplied by the Ministry of Agriculture a rich crop of maize, about three times larger than last year's, is anticipated in some producing districts of the country

## CURRENT INFORMATION ON RICE.

*Argentina:* In spite of the damages caused to the rice crop by torrential rains, in most of the producing zones the quality of this product is good on the whole.

*United States:* A 1941 rice crop of 26,536,000 centals (58,970,000 bushels) is indicated by August 1 prospects, an increase of about 365,000 centals (810,000 bushels) from the estimate of July 1. Production in 1940 having been 23,739,000 centals (52,754,000 bushels), and the 5-year (1935-39) average production being 22,398,000 centals (49,774,000 bushels), percentages are respectively 111.8 and 118 5. The indicated 1941 production is the largest in the history of the rice industry of the United States, and the corresponding acreage, 1,186,000 acres, is the second largest, exceeded only by that of 1920.

## CURRENT INFORMATION ON POTATOES.

*Belgium* · The lifting of the very early varieties besides the "Erstlingen" was started at the beginning of August. The rains which fell at the end of July had a most beneficial influence on the growth of the late varieties. There are no complaints about the development of tubers locally. The delivery of the half-early varieties was started about August 10, so that towards mid-August the supplies of potatoes, which had been rather unsatisfactory, began to improve.

*Denmark :* The drought has not yet influenced the growth of potatoes and rains during the last growing period might improve crop prospects. However the great heat caused the plants to be attacked by insects. Crop estimates, according to the Institute's system, were 87 on August 1, as against 90 on July 1, 1941 and 91 in August 1, 1940.

*Finland :* Crop condition of potatoes on July 1, 1941 were, according to the country system, 5.3 as against 5.0 on June 1, 1941 and 5.2 on July 1, 1940.

*France :* According to the information given by the Ministry of Agriculture the area sown to potatoes has been considerably increased this year. The fight against harmful insects was carried out methodically. A good crop is anticipated.

*Hungary :* During the first fortnight of July the gathering of the early potatoes was in progress. Tubers were well developed and sound. The late varieties were growing wery well. During the latter part of July the weather was somewhat wet which favoured the late varieties, which are sound and of a beautiful colour. The "Erstelingen" have already been gathered and a great part sent to the markets. General production appears satisfactory.

*Norway:* Condition of potatoes crop on August 1 was 103

*Romania :* Potatoes were cultivated on an area fare more extensive than that of last year. Crop prospects are good.

*Sweden :* Potatoes, on the whole, seem to have stood the dry weather well and the rains during the first fortnight in July favoured their growth. On July 15, 1941 crop condition was estimated, according to the system of the country at 105 as against 100 at the same time last year.

*Switzerland :* Potatoes crop offer different aspects and yields vary according to the quality and variety of potatoes and quality of the soil At the beginning of the season the wet weather, which lasted until June, hampered both the growth of the young plants and the cultivation. Later on the drought proved another detrimental factor. Spring varieties yielded a poor crop and among these varieties the "Bintje" were best. In those cases where it was possible to dispose of good seeds the late varieties promise normal yields. Condition has considerably improved since mid-July The average of the crop will be however rather inferior to last year's. The mildew of the potatoes has not appeared and in a number of territories the Colorado beetle greatly increased the corresponding work On the other hand virus disease was quite frequent At the beginning of August crop condition was, according to the country's own system, as follows 69 as against 74 on July 1, 1941 and 80 on August 1, 1940.

*Canada:* According to the Dominion Bureau of Statistics, condition of potatoes crop on July 31, 1941, in per cent of long time (1908-1940) average yield per acre was 89, compared with 93 a month before and 95 on July 31, 1940.

*United States :* The production of potatoes in 1941 is estimated at 221,816,000 centals (369,693,000 bushels) against 238,633,000 (397,722,000) in 1940 and an average of 222,110,000 (370,183,000) in 1935 to 1939; percentages, 93.0 and 99.0.

*Turkey :* According to information received from the Ministry of Agriculture an extension of ground to be sown with potatoes is planned so as to secure a crop by 30 per cent. larger than the normal. The next crop of potatoes will not only be sufficient to meet home requirements but even to be eventually exported.

*Argentina :* According to the second official estimate production of potatoes in 1940-41 is about 23,281,000 centals (38,801,000 bushels) against 23,612,000 (39,352,000) in 1939-40 and 14,728,000 (24,546,000) on the average of the five years ending 1938-39; percentages 98.6 and 158.1.

The increase in comparison with the average is almost consequent to the increase of the cultivated area from 351,000 on the average of 1934-35/1938-39 to 596,000 acres in 1940-41.

# SUGAR SEASON

In the northern European countries the weather at the beginning of July was hot and sunny and only interrupted by some local rains, but, on the whole, the weather was dry, in fact very dry, so that in several cases the damage caused by the drought was heavy, especially to the sugar beet crops and, in general, to all root crops. Towards the end of July rains set in and continued during August. It cannot yet be stated whether any damage was caused through lack of moisture. The growing of the sugar beet plants was not always regular. Damages caused by insects are being reported. Conditions of sugar beet crops were better in central European countries. Also in these parts the weather in July was hot and calm and, although the land had not suffered from lack of rains and storms, the abundant rains at the end of the month and at the beginning of August

*Acreage of Sugar-beet.*

| COUNTRIES | 1941 (1) | 1940 | Average 1935 to 1939 | % 1941: 1940 = 100 | % 1941: Average = 100 |
|---|---|---|---|---|---|
| | acres | | | | |
| *Germany | ... | (2) 2,000,000 | 1,199,460 | ... | ... |
| Belgium | (3) 119,480 | (3) 118,961 | 120,352 | 100 | 99 |
| *Bohemia Moravia | ... | 351,000 | 319,512 | .. | ... |
| Slovakia | (3) 47,000 | (3) 47,000 | (2) (4) 35,337 | 100 | 133 |
| Bulgaria | 50,000 | 40,000 | 22,638 | 125 | 218 |
| Denmark | (3) 116,900 | 109,000 | 97,784 | 107 | 120 |
| *Spain | ... | 136,000 | 191,500 | ... | ... |
| Finland | 8,200 | 8,200 | 10 127 | 100 | — |
| France | (2) 502,000 | (2) 282,000 | 578,680 | 178 | 87 |
| Hungary | 227,000 | (5) 180 000 | 104,727 | 126 | 217 |
| *Ireland | ... | 65,000 | 54,646 | ... | ... |
| Italy | 320 000 | 363,000 | 287,536 | 88 | 112 |
| *Netherlands | ... | 119,800 | 106,178 | ... | ... |
| Romania | 120,000 | 90,649 | 97,134 | 136 | 127 |
| *United Kingdom | ... | 350,000 | 342,901 | ... | ... |
| Sweden | 131,200 | 134,200 | 127,884 | 98 | 103 |
| Switzerland | 8,600 | 8,280 | 6,002 | 104 | 144 |
| *Yugoslavia | ... | 125,000 | 71,185 | ... | ... |
| *Total Europe (a)* | *1,650,380* | *1,381,290* | *1,488,201* | *120* | *111* |
| U.S.S.R | (6) *3,072,000* | (6) *3,027,000* | *2,984,978* | *101* | — |
| *Total Europe (b)* | *4,722,380* | *4,408,290* | *4,473,179* | *107* | *106* |
| Canada | 71,000 | 78,100 | 52,860 | 91 | 134 |
| United States | 761,000 | 916,000 | 828,220 | 83 | 92 |
| *Total North America* | *832,000* | *994,100* | *881,100* | *84* | *94* |
| *Japan | ... | 46,500 | 45,572 | ... | ... |
| Turkey | 120,498 | 104,144 | 66,109 | 116 | 182 |
| *Total Asia* | ... | ... | ... | ... | ... |
| TOTALS a) | **2,602,878** | **2,479,534** | **2,435,410** | **105** | **107** |
| TOTALS b) | **5,674,878** | **5,506,534** | **5,420,388** | **103** | **105** |

* Not included in the totals. — (a) Not including U.S.S.R. — (b) Including U.S.S.R. — (1) Approximate data — (2) Licht's estimate. — (3) Datum of the International Association for Sugar Statistics. — (4) Average of two years — (5) Including the reannexed northern zone and Sub-Carpathia. — (6) Actual boundary.

on a soil that had not been affected by the drought were most beneficial to the growth of the roots. Rains, in general, were more abundant in the western part of this zone gradually decreasing in intensity towards the eastern part. The sugar beet roots were, on the whole, somewhat smaller than the normal size for this period of the year and the plants were in some instances behind time. They are, however, strong and sound and the foliage is rather abundant and of a beautiful colour. Owing to the hot weather the insects renewed their attacks several times but, on the whole, a good crops is anticipated. Crop conditions of the sugar beet in southern Europe are satisfactory, especially in the Balkan countries, which benefited by the abundant rains, whereas in the western countries the long drought in some districts and the attacks by the insects were detrimental.

Summing up, general conditions of sugar beet crops in Europe at the beginning of August were still good, although somewhat less satisfactory than a month before following the drought that had prevailed in some countries and the somewhat smaller-scale attacks by insects.

## CURRENT INFORMATION ON SUGAR.

*Bulgaria:* The sugar-beet crops have developped very well An early harvest may be expected

*Denmark:* The crop condition, according to the Institute's system, as 90 on August 1, 1941 as against 88 on July 1, 1941 and 97 on August 1, 1940

Results of the weekly analyses of sugarbeets.

| WEEK | Average weight of root | | | Average weight of leaves | | | Sugar content | | | Weight of sugar per root | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1941 | 1940 | 1935-1939 | 1941 | 1940 | 1935-1939 | 1941 | 1940 | 1935-1939 | 1941 | 1940 | 1935-1939 |
| | oz | oz. | oz | oz | oz. | oz | % | % | % | oz | oz | oz |
| 1st. week of August | 7.7 | 8.5 | 8 0 | 16.1 | 16.9 | 14,8 | 9.6 | 13.3 | 12.7 | 0 8 | 1.1 | 1.0 |
| 2nd week of August | 9.1 | 10.8 | 9.6 | 16.8 | 18.0 | 15.2 | 11.6 | 13.7 | 13.7 | 1.1 | 1.5 | 1.3 |

*France:* According to information issued by the Ministry of Agriculture the area sown to sugar beets is larger than last year's.

*Hungary:* The sugar-beet crop is confirmed to be slightly above the average. In some places, more or less important damage was done by plantlice, but, generally speaking, beet is developping very well, leaves being thick and of a fine fresh colouring. Roots are big and healthy.

*Netherlands:* The analysis of sugar beets in the fifth week in July showed a weight of the tuber of 9 ounces against 10 ounces in the average; a sugar conten. of 13.5 per cent. against 12.6 per cent.; a weight of sugar per root of 1.3 ounces against 1 3 ounces.

The number of plants per acre is of 25,214 against 25,090.

*Serbia:* Sugar beet crops are quite promissing and if weather conditions continue to be favourable a crop of about 6,600,000 centals (330,000 bushels) can be expected, which would yield 770-880,000 centals (38-44,000 bushels) of sugar.

*Sweden.* Sugar-beet has developped in an irregular manner, there was reported some damage done by insects

On July 15, 1941, the condition of the crops was, according to the system of the Institute, at 93, just as at the same time last year

*Switzerland:* Sugar beets promise a good crop, the dry and warm weather of July was particularly beneficial to the plants Crop conditions, according to the country's own system, were estimated at 75 on August 1, the same as in July, as against 79 on August 1, 1940

## *Production of Cane-Sugar*

| COUNTRIES | 1940-41 (1) | 1939-40 | Average of 1934-35 to 1938-39 | 1940-41 (1) | 1939-40 | Average of 1934-35 to 1938-39 | % 1940-41: 1939-40 = 100 | % 1940-41: Average = 100 |
|---|---|---|---|---|---|---|---|---|
| | 000 centals | | | short tons | | | | |
| **AMERICA** | | | | | | | | |
| Antigua | 540 | 309 | 520 | 27,000 | 15 000 | 25,984 | 175 | 104 |
| Argentina | 11,845 | 11,469 | 8,804 | 592,218 | 573,455 | 440,171 | 103 | 135 |
| Barbados | 1,698 | 1,587 | 2,718 | 85,000 | 79,000 | 135,905 | 107 | 62 |
| Brazil | 28,506 | 25,923 | 23,231 | 1,425,000 | 1,296,130 | 1,161,530 | 110 | 123 |
| Cuba | (2) 54,678 | 63,163 | 60,266 | (2) 2,733,880 | 3,158,000 | 3,013,269 | 87 | 91 |
| United States (La & I I) | 7,077 | 10,392 | 8,528 | 353,854 | 519,597 | 426,400 | 68 | 83 |
| British Guiana | 4,255 | 3,748 | 4,233 | 213,000 | 190,000 | 211,669 | 114 | 101 |
| Jamaica | 3,527 | 2,227 | 2,289 | 176,000 | 111,000 | 114,455 | 158 | 154 |
| Martinique | 1,213 | 1,323 | 1,167 | 64,000 | 70,000 | 58,359 | 92 | 104 |
| Mexico | 6,900 | 6,834 | 6,763 | 345,000 | 340,000 | 338,128 | 101 | 102 |
| Peru | 9,590 | 9,921 | 8,426 | 480 000 | 500,000 | 421 291 | 97 | 114 |
| Puerto Rico | 18 151 | 20,375 | 17,748 | 907,500 | 1,018 700 | 887,390 | 89 | 102 |
| Dominican Republic | (2) 7 840 | 10,188 | 9,339 | (2) 392,000 | 509,400 | 466,926 | 77 | 84 |
| St Kitts | 851 | 692 | 700 | 42,500 | 34,600 | 34,977 | 123 | 122 |
| Trinidad | 2,734 | 2,065 | 3,086 | 137,000 | 103,250 | 154,308 | 132 | 89 |
| Venezuela | 611 | 542 | 514 | 30,500 | 27,100 | 25,706 | 113 | 119 |
| *Total America* | *160,016* | *170,758* | *158,332* | *8,001,452* | *8,545,232* | *7,916,468* | *94* | *101* |
| **ASIA** | | | | | | | | |
| Taiwan | 20,803 | 26,630 | 23,776 | 1,040,100 | 1,331,500 | 1,188,782 | 78 | 87 |
| India | 76,655 | 72,598 | 72,761 | 3,833,000 | 3,630,000 | 3,638,000 | 106 | 105 |
| Japan | 2,399 | 3,386 | 2,751 | 119,900 | 169,300 | 137,560 | 71 | 87 |
| Java | 38,361 | 34,569 | 23,832 | 1 920,000 | 1,728,000 | 1,191,582 | 111 | 161 |
| Philippines | (2) 21,839 | (2) 21,065 | 21,141 | (2) 1,091,900 | (2) 1,053,200 | 1,057,042 | 104 | 103 |
| *Total Asia* | *160,057* | *158,248* | *144,261* | *8,004,900* | *7,912,000* | *7,212,966* | *101* | *111* |
| **AFRICA** | | | | | | | | |
| Egypt | 3,924 | 3,524 | 3,213 | 196,000 | 176,198 | 160,668 | 111 | 122 |
| Mauritius | 6,957 | 5,059 | 6,150 | 347,850 | 252,930 | 307,505 | 138 | 113 |
| Reunion | 1,874 | 1,622 | 1,782 | 94,000 | 81,100 | 89,098 | 116 | 105 |
| Union of South Africa | 11,463 | 11 839 | 10,010 | 570,000 | 592,000 | 500,515 | 97 | 115 |
| *Total Africa* | *24,218* | *22,044* | *21,155* | *1,207,850* | *1,102,228* | *1,057,786* | *110* | *114* |
| **OCEANIA** | | | | | | | | |
| Australia | 18,010 | 20,787 | 16,607 | 900,500 | 1,039,400 | 830,341 | 87 | 108 |
| Hawaii | 19,379 | 19,028 | 19,112 | 969,000 | 951,400 | 955,596 | 102 | 101 |
| Fiji Islands | 2,315 | 2,205 | 2,973 | 116,000 | 100,000 | 148,630 | 105 | 78 |
| *Total Oceania* | *39,704* | *42 020* | *38,692* | *1,985,500* | *2,090,800* | *1,934,567* | *94* | *103* |
| **TOTALS** | **383,995** | **393,070** | **362,440** | **19,199,702** | **19,650,260** | **18,121,787** | **98** | **106** |

(1) Approximate data. — (2) Willet & Gray estimate.

*Canada*: According to the Dominion Bureau of Statistics, condition of sugar beets crop on July 31, 1941, in per cent. of long-time (1908-1940) average yied per acre was 92, compared with 98 a month before and 94 on July 31, 1940.

*United States:* The production of sugar beets in 1941 is estimated at 194,600,000 centals (9,730,000 short tons) against 243,840,000 (12,192,000) in 1940 and an average of 192,464,000 (9,623,000) in 1935 to 1939; percentages, 79.8 and 101.1.

The production of sugar cane for sugar in 1941 is estimated at 106,480,000 centals (5,324,000 sh tons) against 77,620,000 (3,881,000) in 1940 and an average of 113,632,000 (5,682,000) in 1935 to 1939; percentages, 137.2 and 93.7.

## CURRENT INFORMATION ON VINES.

*Bulgaria* According to unofficial reports, the vintage promises to be rather good this year The Bulgarian government is taking all necessary steps to overcome some difficulties (shortage of labour hands, sale of the produce, question of prices, etc.) due to the present international situation.

*Spain* According to information given in the press, the output of wine will be a normal one this year, or even above the normal level, and anyhow much larger than the very poor one of last year

*Hungary* The hot weather in the first fortnight of July and the moist on the second half of the month were propitious to the vegetation of vines Mildew caused some damage only to vineyards in the lowest zones In certain places, some damage was done by hail

*Italy* According to information issued at the time of the meeting of the Wine Corporation wine production for the present year can be estimated at at least about 814 millions of Imperial gallons (977 millions of American gallons)

*Romania* The vineyards having been attacked by cryptogamic diseases, the vintage is expected to be some 50 per cent below the normal level.

*Switzerland.* Vineyards grew very well on account of good weather and of the great mid-summer heat. Unfortunately hail set in in the lake Bienne region and also in La Côte (Mont sur Rolle) district Prospects are quite satisfactory in the Romande region and in le Valais. The raisin has developed quite well, so that except for the Saint Gallois Oberland and the Grisonne Herrschaft districts an average crop may be expected.

Crop condition, estimated according to the country's own system, was at 68 on August 1, as against 64 on July 1, 1941 and 59 on August 1, 1940.

*Argentina*: Latest information confirms that the production of wine raisin has been satisfactory in the producing centres of San Juan, Rio Negro, Salta and la Rioja. In the province of Mendoza results reached an average level whilst in the provinces of Santa Fé and Cordoba they were below the average

According to the *Junta Reguladora de Vinos*, the output of wine in 1940-41 amounts to 167,973,000 Imperial gallons (201,721,000 U. S. gallons), while the stocks existing on June 30, 1941 are estimated to be some 66,279,000 Imperial gallons (79,595,000 U. S. gallons). Thus the available amounts of the Argentina market reach some 234,252,000 Imperial gallons (281,315,000 U. S. gallons), while the average home consumption absorbs some 158,382,000 Imperial gallons (190,203,000 U. S. gallons).

• *United States* The production of grapes in 1941 is estimated at 51,076,000 centals (2,554,000 short tons) against 50,878,000 (2,544,000) in 1940 and an average of 49,509,000 (2,475,000) in 1935 to 1939, percentages, 100 4 and 103 2.

## CURRENT INFORMATION ON OLIVES.

*Portugal :* The production of olive oil in 1940-41 is estimated at 760,000 centals (10,132,000 American gallons) against 1,671,000 (22,283,000) in 1939-40 and an average of 1,019,000 (13,590,000) in 1934-35 to 1938-39, percentages, 45.5 and 74 6.

*Argentina* The olive output was satisfactory in the provinces of Mendoza, San Juan, Catamarca and excellent in the province of La Rioja. In Corrientes instead olive trees were damaged by excessive rains.

*United States* · At the beginning of July condition of California olives was average, but considerably below that of last year.

*Turkey* A good olive crop is expected this year According to the estimates of the Department of Agriculture, it reaches some 880,000 centals, as compared with a yearly average of 575,000 to 600,000 centals The condition of the olive trees is excellent, especially in the Western zone of the economic region of Izmir

## CURRENT INFORMATION ON FLAX.

*Hungary* On July 15, spinning flax crops were thick and high In some places pulling out and barning had begun.
At the end of July, flax was well developped The soaking of the produce for spinning had already begun. In the case of flax meant chiefly for the production of seed, the harvest and threshing were going on, with rather poor results

*Romania* · Flax was sown on a rather extensive area this year Considering that farmers are coming up against difficulties as far as the finding of the necessary labour hands for the gathering of flax for spinning is concerned, very likely part of the crop will be used for sowing purposes

*Argentina* · Flax cultivation was favoured by good weather conditions which prevailed in the main producing centres of the country in July

*Canada* Crop condition of flaxseed on July 31, 1941, was 80 per cent. of the long-time (1908-1940) average yield per acre, compared with 87 a month before and 85 on July 31, 1941. The first estimate of the area cultivated with flaxseed in the Prairie Provinces is 940,000 acres, against 363,700 in 1940 and 297,800 on the average of the 5 year period 1935-39; percentages· 258,5 and 315.7 On the basis of this estimate, considering that the flaxseed acreage of the Prairie Provinces amounts to more than 97 per cent. of the total, and the production more than 93 per cent., the total acreage for all Canada may be estimated at 975,000 acres, compared with 397,400 in 1940 and 308,500 on the average of the preceding 5-year period; percentages: 245.3 and 316 0. An approximate forecast of the production may be calculated on the basis of crop condition on July 31 and of the long-time average yield per acre. The result of this calculation is a production for all Canada of 3,825,000 centals (6,830,000 bushels) against 1,786,000 centals (3,189,000 bushels) in 1940 and 858,400 centals (1,533,000 bushels) on the average of the preceding 5- year period; percentages: 214.2 and 445.6.

*United States:* The production of linseed in 1941 is estimated at 17,198,000 centals (30,711,000 bushels) against 17,482,000 (31,217,000) in 1940 and an average of 6,181,000 (11,037,000) in 1935 to 1939, percentages, 98.4 and 278 2

## CURRENT INFORMATION ON COTTON.

*Romania:* The area under cotton is estimated to be this year some 42,000 acres. The sowings could be proceeded with in due time. The rainy spring weather was not favourable to the crops, but the latter improved to a large extent later on, owing to the heat

*United States* During the first half of August, weather has been generally favourable for cotton, whose progress has been mostly good

During the week ending August 20, weather has been rather favourable for cotton.

### Summary of the Cotton Reports issued by the Government of the United States, during the cotton season (August 1-July 31)

| | Provisional estimates for dates indicated 1941 42 | Final estimates: 1940 41 | Final estimates: Average 1935 36 to 1939 40 | Percent 1941 42: 1940 41 = 100 | Percent 1941 42: Aver. = 100 |
|---|---|---|---|---|---|
| *Report referring to July 1* | | | | | |
| Area in cultivation (acres) | 23,519 000 | 24,871 000 | 28 496 000 | 94 6 | 8 5 |
| *Report referring to August 1* | | | | | |
| Area left for harvest (acres) | (1) 23,107,000 | (2) 23,861,000 | (2) 27,788 000 | 96 8 | 83 1 |
| Crop condition (per cent of normal) | 72 | 72 | (3) 72 | — | — |
| Production (4) | 10,817,000 | 12,565 000 | 13,148,000 | 86 1 | 82 3 |
| Yield of lint per acre, in lb. | 224 4 | 252 5 | (3) 205 4 | 88 9 | 109 3 |
| *Cotton ginned to August 1* (5) | 1,966 | 32,187 | 114,716 | 6 1 | 1.7 |
| *Cotton ginned to August 16* (5) | 74,101 | 169,420 | 342,307 | 43 7 | 21 6 |

(1) Area in cultivation on July 1 less the ten year (1931 40) average abandonment from natural causes 1 9 per cent — (2) Area actually harvested — (3) Ten year (1930 39) average — (4) In bales of 478 lb net weight and exclusive of linters. — (5) In running bales, counting round bales as half bales and exclusive of linters.

*India* According to the supplementary report area cultivated to cotton in 1940-1941 was 22,902,000 acres, against 21,580,000 in 1939 40 and 24,589,000 on the average of the five years ending 1938-39, percentages 106 1 and 93 1 The corresponding production is estimated at 4,841,000 bales of 478 lb net weight against 4,108,000 and 4,635,000, percentages 117 8 and 104 4.

*Egypt*· According to the third and final report cotton production in 1940 is estimated now at 1,900,100 bales of 478 lb net weight, as against 1,815,200 bales in 1939 (revised estimate), an increase of 4 7 per cent , and 1,846,100 bales for the five-year average ending with 1938, an increase of 2.9 per cent The area harvested is estimated at 1,749,000 acres, an increase of about 4 per cent in comparison with the corresponding area of 1939 (1,687,000 acres) but a decrease of about 5 per cent in comparison with the five-year average. The average yield of cotton lint per harvested acre of 519 pounds obtained from the crop of 1940, is comparable to that of 1936 and 1939 and second only to the record of 1937

*Classification of the Egyptian cotton crop by staple length, in bales of 478 lb. net weight.*

(000's omitted)

| Varieties | 1940 | | 1939 | | 1938 | | 1937 | | 1936 | | 1935 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Acres | Bales* | Acres | Bales | Acres | Bales | Acres | Bales | Acres | Bales | Acres | Bales |
| 1) Long staple: above 1 3/8" | 781 | 680 | 812 | 668 | 871 | 562 | 836 | 740 | 709 | 592 | 702 | 551 |
| (*Sakellaridis*) | (91) | (66) | (72) | (43) | (144) | (61) | (167) | (116) | (168) | (108) | (309) | (187) |
| (*Giza 7*) | (538) | (476) | (625) | (529) | (595) | (405) | (539) | ... | (423) | ... | (280) | ... |
| 2) Long-medium staple: above 1 1/4" | 43 | 48 | 68 | 87 | 54 | 46 | 31 | 32 | 36 | 30 | 57 | 43 |
| 3) Medium staple: above 1 1/8" | 925 | 1,137 | 807 | 1,012 | 927 | 1,084 | 1,186 | 1,469 | 1,036 | 1,223 | 974 | 1,135 |
| *Scarto* | — | 35 | — | 34 | — | 36 | — | 40 | — | 42 | — | 40 |
| *Total* | *1,749* | *1,900* | *1,687* | *1,801* | *1,852* | *1,728* | *2,053* | *2,281* | *1,781* | *1,887* | *1,733* | *1,769* |

(*) Third estimate — (1) Maarad, Sakha 4, Sakellaridis, Malaki, Karnak, Giza 7. — (2) Wafeer, Fuâdi, 3, etc. — (3) Ashmûni and Zagôra

## CURRENT INFORMATION ON HEMP.

*Hungary* The condition of spinning hemp crops has improved owing to warm weather during the first fortnight of July

About the end of July, hemp grown chiefly for seed was progressing well; it had reached, or passed, the blossoming period

Crops meant chiefly for spinning were thick, but not high enough Blossoming had begun In various places soaking was already going on

*Romania* The hemp crop is in a satisfactory condition.

## CURRENT INFORMATION ON TOBACCO.

*Bulgaria* The tobacco crops have a very good, and in some places even an exceptionally good, appearance, both as to quantity and quality.

*Hungary* About the middle of July, the vegetation of tobacco plants was vigorous, and the leaves were well developped and healthy. Hoeing was proceeding.

The tobacco plantings had a fine vegetation at the end of July. The plants began to blossom The gathering of the lower leaves had begun in several places.

*Switzerland:* According to the country's own system, crop conditions at the beginning of August were estimated at 70 as against 68 on July 1, and 73 on August 1, 1940.

*United States* The production of tobacco in 1941 is estimated at 1,288,212,000 pounds against 1,451,966,000 in 1940 and an average of 1,453,120,000 in 1935 to 1939; percentages, 88.7 and 88.7.

*Turkey.* Considering that present sale dificulties have induced agriculturers to considerably reduce the area sown to tobacco and that the season did not continue very favourably for the growth, it can be stated that production of tobacco in 1941 will be remarkably lower than that of last year.

In the Izmir economic region, which is the most important producing one, it appears that 84,000 acres have been cultivated as against 106,000 in 1940 and 111,000 in 1939. First estimate indicates a crop of 44.1 to 52.9 million lb. as against 76.1 million lb. in 1940.

## CURRENT INFORMATION ON HOPS.

*Hungary :* Hops had a vigorous aspect at the beginning of the blossoming period.

About the end of July, hops had developped vigorously; the stalks were high and the cones fine and nearing maturation.

*United States :* The production of hops in 1941 is estimated at 41,408,000 pounds against 42,552,000 in 1940 and an average of 38,002,000 in 1935 to 1939; percentages, 97.3 and 109.0.

## CURRENT INFORMATION ON OTHER PRODUCTS.

### Coffee.

*Brazil* The National Department for Coffee Production (D. N. C) has set a quota of 35 per cent. for the 1941-42 coffee campaign. Available stocks in Brazilian ports are still under the normal figure. The D N C. has likewise fixed for every Brazilian State the quota of coffee exports to the United States from October 1 to September 30, 1942.

*Hawaii* The latest official report confirms that the condition of coffee plantations is satisfactory

### Soya.

*Bulgaria* The codition of the soy-bean crops is good

*Hungary* The condition of the soy-bean crops was good on July 15.

### Sunflower.

*Romania* 1,000,000 acres of sunflower have been sown as against 350,000 acres last year A remarkable increase in the growing of other oil plants is also anticipated.

## CURRENT INFORMATION ON FODDER CROPS.

*Bulgaria* Mangels have developped very well The alfalfa output is good. The amount of hay obtained is satisfactory, and the condition of the pasture good.

*Denmark.* The hay crop is likely to be a poor one. The gathering of field hay took place under favourable conditions, that of meadow hay is going on. The quality is on the whole good in the case of clover, and satisfactory in the case of alfalfa.

The crops of turnips and mangels have not yet suffered too much from drought, and the harvest outlook may be still improved by good rains in the last vegetation period. At the middle of July, meadows were suffering from lack of rain, and there was but very little after-grass, so that in some places it was necessary to feed cattle with corn and straw The condition improved somewhat later on, on account of rains having fallen in the second half of July.

The condition of the main forage crops was, according to the system of the Institute, as follows:

| Crops | August 1, 1941 | July 1, 1941 | August 1, 1940 |
|---|---|---|---|
| Artificial meadows for hay | 52 | 54 | 68 |
| Natural meadows for hay | 65 | 72 | 72 |
| Pasture | 60 | 57 | 72 |
| Turnips | 89 | 87 | 92 |
| Mangels | 86 | 83 | 95 |

*Finland:* Crop condition of artificial meadows on July 1, 1941 as compared with June 1, 1941 and July 1, 1940 was 4,4 as against 4,1 and 3,7. Corresponding figures for natural meadows were as follows: 4.3, 3.9 and 3.5.

*Hungary:* By the middle of July, the condition of forage crops was as follows:

The weather during the first fortnight of July was very propitious to forage crops. In the case of early varieties, the third weeding was ended; in that of late ones, it was proceeding. Plant-lice had done some damage.

The second mowing of clover was proceeding with good results, but, generally speaking, average ones. The second, and sometimes third, mowing of alfalfa had begun. The returns varied from average to good ones. Fodder corn showed a satisfactory vegetation. Hay of the first mowing of the meadows was in most cases already barned, and it was satisfactory wherever the mowings had not been drenched by rain. Pasture that had not been watered enough by rains were rather poor. Elsewhere, the growth of the grass was very satisfactory and rich The weather of the second half of July with its moderate rains was particularly favourable to forage crops in general.

The second mowing of clover has given a good average crop. The third mowing of alfalfa has given good results, both as to quantity and quality. At the end of July, fodder corn had a good appearance, and the after-grass of the meadows allowed to expect a good return. The vegetation of the pasture was satisfactory in the regions where the soil did not lack moisture.

*Norway:* On August 1 condition of fodder crops was as follows: temporary meadows 83, permanent meadows 89, mangels 90, turnips 97, kohl-rabi 94.

*Romania:* Meadows for hay appear to be in good condition

*Sweden:* The drought has done serious damage all over the country, save in the northernmost regions.

Forage roots have also suffered from drought, and there were complaints about damage done by insects as well.

On July 15, 1941, the condition of the chief forage crops, as compared with the same time last year, was, according to the system of the Institute, as follows

| Crops | July 15, 1941 | July 15, 1940 |
|---|---|---|
| Artificial meadows | 71 | 82 |
| Natural meadows | 77 | 77 |
| Forage roots | 80 | 93 |

*Switzerland:* Owing to the drought during the first fortnight of July the harvest on natural meadows will be lower than last year's as far as the quantity is concerned; prospects regarding clover and alfalfa are better. Available quantities of green fodder have been reduced temporarily but they still meet requirements. As a consequence of the stormy rains which set in after mid-July grass conditions improved gradually and the growth of fodder seems again reassuring.

The condition of the various feed crops is indicated as follows (basis a good crop made equal to 100):

| | August 1, 1941 | July 1, 1941 | August 1, 1940 |
|---|---|---|---|
| Natural meadows | 66 | 76 | 73 |
| Artificial meadows (clover, alfalfa, etc.) | 73 | 81 | 77 |
| Pasture | 79 | 69 | 67 |
| Mangels | 72 | 73 | 80 |
| Feed carrots | 71 | 70 | 77 |

*Argentina :* Fodder prospects in July were satisfactory thanks to favourable weather conditions prevailing during that month.

*Canada:* According to the Dominion Bureau of Statistics, condition of the principal fodder crops on July 31, 1941, in per cent of long-time (1908-40) average yields per acre was as follows:

| Crops | Condition in percent 1941 July 31 | 1941 June 30 | 1940 July 31 |
|---|---|---|---|
| Hay and Clover | 80 | 85 | 98 |
| Fodder corn | 89 | 87 | 86 |
| Turnips | 89 | 87 | 94 |
| Pasture | 79 | 83 | 99 |

*United States*. According to the most recent estimate area under permanent meadows this year is about 11,445,000 acres against 10,896,000 in 1940 and 11,506,000 on the average of the five years ending 1939; percentages 105 and 99.5. The corresponding production of wild hay is estimated at about 214,300,000 centals (10,715,000 short tons) against 176,880,000 (8,844,000) and 187,656,000 (9,383,000), percentages 121.2 and 114.2

The area cultivated to rotation meadows this year is about 62,488,000 acres against 61,592,000 in 1940 and 56,630,000 on the average of the five years ending 1939, percentages 101.5 and 110.3 The corresponding production of tame hay is estimated at about 1,703,740,000 centals (85,187,000 short tons) against 1,726,240,000 (86,312,000 and 1,489,080,000 (74,454,000) percentages 98.7 and 114.4.

## LIVESTOCK AND DERIVATIVES

### LIVESTOCK DERIVATIVES IN DENMARK.

According to data recently published by the Danish Bureau of Statistics, the average monthly output of the main livestock derivatives was the following in the first half-year of 1941, as compared both with the same period of 1940 and with the years 1940 and 1939:

*Average monthly production.*

| Products | Unit | 1st half year 1941 | 1st half year 1940 | Year 1940 | Year 1939 |
|---|---|---|---|---|---|
| Milk | million lb. | 604 | 882 | 776 | 891 |
| Butter | » | 23 | 34 | 30 | 34 |
| Eggs | millions | 106 | 224 | 162 | 196 |
| Pork | million lb. | 32 | 52 | 54 | 54 |
| Other meat | » | 26 | 34 | 39 | 30 |

Thus the output of milk has decreased, as compared with the first half-year of 1940, by 31.5 per cent., the one of butter by 31.2 per cent., that of eggs by

52 7 per cent that of pork by 39.2 per cent, and that of other meat by 23 0 per cent

The extent to which have decreased in the same time the export of livestock derivatives is shown in the following table.

*Average monthly exports*

| Products | Unit | 1st half year 1941 | 1st half year 1940 | Year 1940 | Year 1939 |
|---|---|---|---|---|---|
| Butter | million lb | 11 | 27 | 20 | 28 |
| Eggs | millions | 56 | 134 | 112 | 142 |
| Pork | million lb | 19 | 28 | 26 | 35 |
| Pigs | thousands | 27 7 | 25 4 | 62 8 | 11 4 |
| Beef | million lb | 1 | 3 | 2 | 4 |
| Cattle | thousands | 16 9 | 19 7 | 31 1 | 13 6 |

**PIGS IN DENMARK.**

(Thousands of head)

| Classification | 1941 July 12 | 1941 May 30 | 1941 April 19 | 1941 March 8 | 1941 Jan 25 * | 1940 Dec 13 | 1940 Nov 2 | 1940 Sept 21 | 1940 Aug 10 | 1940 June 29 |
|---|---|---|---|---|---|---|---|---|---|---|
| Boars for breeding | 11 | 11 | 11 | 11 | 11 | 11 | 13 | 14 | 16 | 17 |
| Sows in farrow for first time | 78 | 74 | 64 | 45 | 32 | 25 | 22 | 23 | 30 | 50 |
| Other sows in farrow | 85 | 87 | 87 | 93 | 100 | 103 | 108 | 120 | 137 | 146 |
| Sows in milk | 53 | 47 | 51 | 45 | 44 | 49 | 60 | 64 | 73 | 91 |
| Sows not yet covered (and not for slaughter) | 17 | 18 | 15 | 17 | 20 | 23 | 32 | 38 | 41 | 34 |
| Sows for slaughter | 7 | 8 | 7 | 11 | 14 | 17 | 23 | 26 | 18 | 15 |
| *Total sows* | *240* | *234* | *224* | *211* | *210* | *217* | *245* | *271* | *299* | *336* |
| Sucking pigs not weaned | 440 | 390 | 429 | 364 | 350 | 401 | 515 | 539 | 617 | 761 |
| Young and adult pigs for slaughter | | | | | | | | | | |
| Weaned pigs under 35 kg | 420 | 432 | 409 | 455 | 523 | 607 | 669 | 755 | 850 | 840 |
| Pigs of 35 and under 60 kg | 405 | 366 | 419 | 473 | 503 | 516 | 600 | 665 | 690 | 635 |
| Fat pigs of 60 kg and over | 254 | 288 | 333 | 359 | 371 | 437 | 486 | 497 | 519 | 629 |
| *Total pigs* | *1 770* | *1,721* | *1 825* | *1 873* | *1 968* | *2,189* | *2 528* | *2,741* | *2,991* | *3 218* |

* Rural districts

**LIVESTOCK IN SWITZERLAND**

Although cattle chiefly consumes local fodder, its being affected by the decrease of imports of forage and by the fact that meadows were tilled for growing cereals could hardly be avoided, consequently, it had to be reduced to a certain extent The large supply of cattle for slaughter, which had already

burdened the markets for a short time before the war, would have, however, produced by itself a decrease in the live-stocks. Such a development has, as a matter of fact, already begun, but was interrupted for a time by the war. Since the middle of 1940, a decrease appeared the more urgently necessary as it had to exceed the fluctuations of the live-stocks which always are the result of a natural disproportion between the output and the supply of forage and prices. The decrease in numbers took place by two different means: through additional slaughtering of cows and calves that were not apt to be reared and through limiting the breeding of young animals.

*Cattle* (number).

| CLASSIFICATION | 1941 | 1940 | (1) 1939 | 1938 | 1937 | 1936 |
|---|---|---|---|---|---|---|
| Calves not hover 6 months | | | | | | |
| for slaughter | 49,316 | 56,744 | 57,800 | 53,854 | 51,775 | 58,209 |
| for rearing | 167,330 | 208,889 | 204,200 | 209,886 | 216,060 | 200,586 |
| Young cattle from 6 months | | | | | | |
| to 1 year | 109,568 | 116,701 | 112,700 | 116,882 | 117,603 | 94,995 |
| Heifers | | | | | | |
| from 1 to 2 years | 216,294 | 217,543 | 223,500 | 224,918 | 201,443 | 184,444 |
| over 2 years | 124,659 | 127,244 | 130 800 | 124,702 | 107,034 | 103,703 |
| Cows | 862,415 | 910,005 | 926,400 | 912,516 | 893,004 | 882,264 |
| Bulls: | | | | | | |
| from 1 to 2 years | 23,780 | 25,582 | 24,800 | 25,906 | 24,232 | 21,302 |
| over 2 years | 7,942 | 9,208 | 9,900 | 8,458 | 7,774 | 7,342 |
| Oxen: | | | | | | |
| from 1 to 2 years | 13,849 | 13,611 | 13,200 | 16,039 | 12,419 | 10,058 |
| over 2 years | 8,617 | 9,105 | 7,700 | 7,424 | 6,404 | 6,404 |
| TOTAL | 1,583,770 | 1,694 632 | 1,711,000 | 1,700,585 | 1,637,748 | 1,568,738 |

(1) The estimate of the total number for Switzerland is based on the differences in the numbers in the cantons covered by the census

The total number of cattle on April 21, 1941 was 1,583,770 head; thus by 110,900 head, or by 6.5 per cent., less than last year. Such a decrease within a single year is significative; yet, it is a fact that even in peace time there had been registered decreases of 70,000 head within one year. The present number of cattle is already below that of the third year of the last world war (1916), if we take into account the fact that a larger population has to be fed in 1941. However, in the numbers of cattle in the year 1916, which we have taken for the sake of comparison, younger cattle had a bigger share than in the cattle breeding of 1941. The cantons of the Valais, Geneva and the Grisons, which formerly took the smallest share in cattle breeding, naturally enough show also the smallest decrease (by 2 to 3 per cent.) in this connection, while the decrease is relatively larger in the two Appenzell cantons.

The limitation of the breeding of young cattle is manifest and, when compared with the numbers of the foregoing year, much larger than the decrease of the number of cows. The slaughtering of calves must have reached considerable proportions. In fact, there were numbered in the census only 167,300 calves for breeding, *i. e.*, 41,500 head, or 20 per cent. less than in 1940.

This number is the lowest one that has been ascertained since the beginning of the century. Last spring, there were still 49,300 calves for slaughter, showing a decrease of 7,400 head as compared with the foregoing year. The reduction of breeding seems to have begun only last winter, as the number of young cattle of six months to one year of age (109,600) is only by 6.1 per cent. less than in 1940. According to the data received, the temporary increase in the 1940 output is shown by the very small decrease in the number of heifers (0.6 per cent.) and of older animals (2 per cent.). Several cantons were even able to register an increased number of heifers. The output and the number of young cattle six months to one year old and of heifers either one to two years (216,300 heads) or more than two years (124,650 heads) old point out rather to a share above the average

Instead, the small number of calves for rearing allows to foresee a big decrease in the number of heifers and of cows from 18 months to two years old, as the latter have not been kept any longer. If, in the last weeks before the census, the supply of cattle for slaughter has decreased to a large extent, this means only an aggrâvation of a phenomenon which normally recurs at that time of the year. Besides, this decrease depends upon the demand of cattle for pasturing.

The supply has decreased the more on account of the still rather high number of cattle having to be fed out of the already much depleted stocks of forage, which have been nearly exhausted, as the belated spring hindered the pasturing of the animals. It is for this reason that the breeders have abstained from sending lean cattle upon the market, and kept it instead in order to sell it only after it had reached by pasturing a better condition of fatness

In 1940, 40,000 more cows were slaughtered than on the average during the foregoing years. The slaughterings of heifers were higher as well, and this accounts for the decrease by 47,600 heads, or 5.2 per cent., in the number of cows, which is at present some 862,400 heads. Although this number is below the average of the last six years, it ought still to be enough for assuring a satisfactory supply of milk and dairy produce, unless exceptional complications interfere with the supply of forage.

Taking into account the still sufficient number of young cows growing out of heifers, the decrease in the number of cows registered this year is chiefly due to extensive slaughtering and also to exports.

The number of bulls has decreased to a large extent· that of bulls from one to two years old, by only 7.0 per cent. down to 23,800, but that of more than two years old bulls by 13.7 per cent. down to 7,900. Notwithstanding the decrease of the total number of cattle, the growing need of pulling animals has allowed of a slight increase (by 1.7 per cent.) being registered in the number of young oxen (13,800).

Instead, a large amount of older oxen have not been replaced any more, as there were counted only 8,600 of them, *i. e.* 500 less than in April 1940. If the increase in the tilling of fields has to reach the maximum extent foreseen by the plan, the number of cattle will have to be reduced still further, even if this takes place chiefly by adapting breeding to present requirements and eliminating suspected animals and those of a poor quality.

Nearly 50 per cent. of the number of pigs used to be fed before the war with imported forage. Consequently, the breeding of pigs had to be affected most of all by the sudden changes in the supply of forage, by the exhaustion of the stocks and by the relatively important increase in the price of fodder

*Pigs* (number).

| CLASSIFICATION | 1941 | 1940 | (1) 1939 | 1938 | 1937 | 1936 |
|---|---|---|---|---|---|---|
| Young pigs up to 2 months | 141,208 | 219,649 | 203,700 | 229 711 | 242 085 | 202 117 |
| sucking pigs | (106 283) | (160,106) | (141 900) | (167,948) | (177 406) | — |
| other (weaned) | (34,925) | (59,543) | (61,800) | (61 763) | (64,779) | — |
| Young pigs from 2 to 6 months | 380,987 | 456 453 | 420 400 | 434 986 | 437,374 | 394 240 |
| from 4 to 6 months | (217,365) | (240,248) | (203,000) | (207 720) | (209 594) | (206 422) |
| Pigs for fattening over 6 months | 181,289 | 204,250 | 180 800 | 183,579 | 178,405 | 198 838 |
| Sows | (57,271) | (75 077) | (72 000) | (71,531) | (74 609) | (79 061) |
| in farrow | (37 333) | (43 406) | (51 300) | (47,889) | (52,523) | (50 737) |
| in farrow for the first time | — | — | (19 200) | (17 088) | (18 065) | — |
| others | — | — | (32 100) | (30 801) | (34,458) | — |
| not in farrow | (19 938) | (31,671) | (20,700) | (23 642) | (22 086) | (28 324) |
| Boars | 2 286 | 3 242 | 3 100 | 3 000 | 3 155 | 3 255 |
| TOTAL | 726 441 | 958 671 | 880 000 | 922 807 | 835 628 | 877 511 |

(1) The estimate of the total number for Switzerland is based on the differences in the numbers in the cantons covered by the census

As soon as the precarious condition of the supply of fodder had made itself fully felt last summer the offer showed a certain temporary increase because the owners hastened to get rid of animals they were no longer able to feed Later on, the delay in, and at the same time the protraction of the fattening— which from the point of view of a rational use of fodder are not remunerative, but which could not be avoided by many breeders—contributed still more to limiting the bulk of the supply Transitory difficulties met with as to refurnishing the markets could not be avoided, even if the number of animals was still large enough. The delayed fattening and the uncertain forage supply had reduced the demand for young pigs last winter, this caused a slump in prices and increased slaughterings, and induced the interested people to give up breeding As, at the beginning of the war, the owners had to abandon their usual plan of output set up for each holding, even in some other shape, and as the owners of pigs are not able to foresee the extent of the necessary reduction of breeding, it seems that in many regions the latter has been given up too soon. Thus sucking pigs have decreased by 53,800 head, or by 33.6 per cent, so that they are now only 106,300 The weaned ones have decreased by 41.3 per cent, to 34,900 head There were counted again 37,300 sows in farrow, or 14 0 per cent. less than in 1940, and 19,900 ones in lactation, or 37 per cent. less. Since 1939, 15,000 sows have been eliminated without being replaced; yet their number is still larger than in 1916.

Such heavy fluctuations during the last weeks have caused a sudden rise in the prices of sucking pigs, and this rise has again induced many breeders to

delay somewhat the sale of their animals until the purchase of young pigs seemed assured. Of course, questions of price had also some influence.

The total number of pigs is 762,400, the decrease being of 196,200, or 20.5 per cent. The share in the latter of young pigs and pigs for rearing amounts to 97,000 head, the extent of the decrease lessening with the growing age of the animals. There were numbered 24.7 per cent. less sucking and young pigs two to four months old. The absolute figure has fallen to 162,700, *i. e.* by 53,500 while the decrease of young pigs four to six months old was only 9.5 per cent. (their present number being 217,400), notwithstanding last winter's very limited breeding and the easy sale of sucking pigs. The category of pigs for fattening counts still 181,300 head, the decrease being 11.2 per cent. Of all groups of age, only that of four to six months old pigs is still keeping well above the average so that a decrease of the supply could become more pronounced only in the late autumn. Safe a few exceptions, the other categories do not reach the lowest figures of the last six years.

The total number has decreased least (by 11.3 per cent.) in the canton of Zurich, while it was highest (35.6 and 37.2 per cent. respectively) in the two Appenzell cantons, which are particularly given to breeding. The decrease in breeding is likely to have taken place to a large extent at the beginning of the winter The rising tendency of the prices of sucking pigs, which has prevailed since February last, may have hindered slaughterings, especially of sows in farrow.

The total number of pigs is still much larger than in 1916 and 1918, when it was respectively 544,500 and 365,800. The latter figures show the extent of the reduction that might still become necessary in pig breeding.

As a matter of fact, the tilling of the soil having increased as compared with the time of the first world war, more fodder than formerly may be produced for pig breeding, unless there are some bad harvests.

Sheep-breeding enjoys once more a larger amount of interest in the present period of scarcity of textiles. The increase by some 12.3 per cent. since 1936 is shown by a larger share of animals for rearing at the expense of that of sheep for slaughter. The number of sheep has increased by 21,600, reaching a total of 197,700. The share in this incresase of ewes under six months is 2,000. Some regions known until now for their importance in sheep-breeding, such as those of Uri, St Gall, etc., cannot show yet an increase in numbers [sufficient to cover the losses suffered during the period between 1936 and 1939. Temporary difficulties in the sale of sheep for slaughter could hardly have encouraged an increase in sheep breeding in the years 1937 and 1938.

Goat-breeding has lost ground of late. In April last, there were counted 213,360 head, as compared with 220,474 at the same time in 1936. However, the decrease in numbers is limited to kids, while milch goats are even more numerous this year (158,000) than in 1936 (155,032). The war may possibly promote goat breeding to a certain extent, but no similar effect has been noticed until now, as the number of goats is lower than in 1936.

*Other animals* (number).

| Classification | 1941 | 1936 | 1931 | 1926 | 1921 |
|---|---|---|---|---|---|
| Sheep | 197,700 | 176,076 | 184,754 | 169,723 | 245,344 |
| Goats | 213,300 | 220,474 | 237,995 | 289,258 | 330,048 |
| Horses | 144,200 | 139,789 | 140,300 | 139,668 | 134,148 |
| Mules | 2,824 | 3 405 | 3 710 | 3,854 | 3,835 |
| Asses | 630 | 793 | 833 | 943 | 904 |

Since the general mobilisation, horses are again much more in demand for the service of the army and for the extended soil tilling, given the lack of oil. The rising tendency of prices is the best proof of it. However, the number of horses shows that their breeding has already much progressed since 1938. Formerly, in many holdings the horse had to give way to motor power, to the tractor: consequently, last spring, there were counted 106,722 horses, viz 86,000, or 7 per cent. less than in 1936. It is obvious that this decrease has been partly compensated by the number of covered mares, which has risen by 5,000 to 12,000 The number of horse keeping enterprises has diminished by 5,500 from 1936 to 1941. Notwithstanding the manifest revival of breeding, the total number of horse shows, for the reasons stated above, only a small increase of some 4,400 head, or 3.1 per cent, reaching in all 144,200. In central Switzerland and in some mountain cantons, the extension of breeding could not even compensate the decrease suffered from 1936 to 1939. The increase has taken place only in the breeding centres (Bern, etc ). The number of foals born in 1940 and at the beginning of 1941 (9,900) is nearly double that of 1939. However, the growth of young animals is subjected to natural laws which vary but little. Thus some time will have to pass before the foals of today can be used as pulling horses.

## POULTRY AND APICULTURE IN SWITZERLAND.

The number of fowls has been affected by the scarcity of forage almost as much as pig-breeding. Already between 1936 and 1940 there had been registered a decrease of about 900,000 fowls. This decrease has gone on with the same intensity also during last year.

*Poultry-breeding.*

| Years | Number of owners | Chicks under 2 months | Laying hens | Other | Total |
|---|---|---|---|---|---|
| 1918 | 251,304 | — | — | — | 2,383,527 |
| 1921 | 270,202 | — | — | — | 3,247,243 |
| 1926 | 289,262 | — | — | — | 4,115,853 |
| 1931 | 281,193 | 353,957 | 4,410,502 | | 4,864,459 |
| 1936 | 252,470 | 1,168,308 | 4,213,762 | 161,078 | 5,544,148 |
| 1940 | 235,342 | 641,132 | 3,784,828 | 215,391 | 4,641,351 |
| 1941 | ... | 372,772 | 3,238,668 | 133,358 | 3,744,798 |

While the number of poultry-keepers seems to have changed but little as compared with 1940, the number of fowls has again fallen since last year by other 900,000 to 3,744,800, showing a decrease of 19.3 per cent. 60 per cent. of the new decrease refer to brood hens, but the decrease in the breeding of chicks, which amounted to 41.9 per cent. and has brought down the present total to 372,800, and the one in young hens more than two months old, which amounted to 57 per cent., were due to broods having been delayed on account of the cold weather experienced in spring. The greatly reduced number of laying hens is still 3,238,700 or approximately 546,000 less than in 1940, 681,500 of these coming from broods that go further back than 1939. Older hens, which are less efficient, are still well represented, but may have been eliminated to a rather large extent by the reduction of numbers.

The decrease in the number of laying hens, due to more limited food, cannot remain without influencing the supply of eggs, and the decrease in the latter will make the consumers feel the more in the future the diminishing supply of meat.

Geese and ducks were in all 28,311, or 43.6 per cent. less than in 1936, when their number was 50,197.

* * *

As to apiculture, there were, in Switzerland, in the spring of 1941, 35,800 bee-keepers, or 1,870 less than in 1936, when they were 37,600, but, instead, 339,800 bee-hives, or 3,300 more than five years ago.

## CURRENT INFORMATION ON LIVESTOCK AND DERIVATIVES.

*Norway* According to a statement by the Secretary of the Norwegian Bee a satisfactory production of honey is foreseen, production will very likely exceed the average and be decidedly superior to last year's

*Sweden* · According to a declaration by the Committee for Foodstuffs the production of porc will probably be only 10 per cent less than normal requirements

*Argentina* · Sanitary condition of cattle in July were good. The shearing of sheep yielded the usual quality of wool

## CURRENT INFORMATION ON SERICULTURE.

*Bulgaria :* The output of cocoons is this year by 30 per cent. less than in 1940. The decrease is due to domage suffered by the mulberry-trees on account of cold, to the fact that premises normally utilised for breeding purposes have been turned to some other use, and even to scarcity of labour

*Spain :* According to information issued by the Ministry of Agriculture, mulberries grew very well but ripened too soon in relation to the period that the seeds had been hatched, so that silkworms during the first period had to be fed with over-ripe leaves. The season was cold and rainy during the breeding period. The quantity of seeds produced by incubation has been 11,300 ounces as against 9,030 in 1940. The production of cocoons is estimated at 926,000 lb. as against 697,000 lbs. in 1940.

*Japan :* The production of cocoons in 1941 is estimated at 578,715,000 lb. against. 723,649,000 in 1940 and an average of 689,498,000 in 1935 to 1939; percentages, 80.0 and 83.9.

Of that production 165,347,000 lb. are assigned to making short fibres.

# TRADE

| Countries | June | | | | Eleven months (August 1-June 30) | | | | June | | | | Eleven months (August 1-June 30) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Exports | | Imports | | Exports | | Imports | | Exports | | Imports | | Exports | | Imports | |
| | 1941 | 1940 | 1941 | 1940 | 1940-41 | 1939-40 | 1940-41 | 1939-40 | 1941 | 1940 | 1941 | 1940 | 1940-41 | 1939-40 | 1940-41 | 1939-40 |
| **Wheat.** | | | | | | | | | | | | | | | | |
| | Thousand centals (1 cental = 100 lb.) | | | | | | | | Thousand bushels of 60 lb | | | | | | | |
| Portugal | 0 | 0 | 16 | 26 | 0 | 0 | 2,002 | 457 | 0 | 0 | 26 | 44 | 0 | 0 | 3,337 | 762 |
| Romania | 0 | 668 | 0 | 0 | 18 | 18,376 | 0 | 0 | 0 | 1,114 | 0 | 0 | 30 | 30,625 | 0 | 0 |
| United States | 63 | 379 | 723 | 400 | 5,358 | 12,370 | 6,058 | 5,434 | 106 | 632 | 1,205 | 667 | 8,930 | 20,617 | 10,096 | 9,056 |
| Argentina | 4,651 | 9,915 | — | — | 50,305 | 96,853 | — | — | 7,751 | 16,524 | — | — | 83,839 | 161,419 | — | — |
| Peru | ... | ... | ... | ... | [1] 0 | [1] 0 | [1] 1,532 | [1] 2,078 | . | . | ... | .. | [1] 0 | [1] 0 | [1] 2 554 | [1] 3,463 |
| **Wheat Flour.** | | | | | | | | | | | | | | | | |
| | Thousand centals (1 cental = 100 lb). | | | | | | | | Thousand barrels of 196 lb. | | | | | | | |
| Portugal | 0 | 0 | 0 | 0 | 0 | 0 | 16 | 12 | 0 | 0 | 0 | 0 | 0 | 0 | 8 | 6 |
| Romania | 0 | 1 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 |
| United States | 1,086 | 502 | 1 | 15 | 11,697 | 11,004 | 114 | 121 | 554 | 256 | 0 | 7 | 5,968 | 5 614 | 58 | 62 |
| Argentina | 65 | 98 | — | — | 972 | 1,830 | — | — | 33 | 50 | — | — | 496 | 933 | — | — |
| Peru | . | .. | .. | .. | [1] 0 | [1] 0 | [1] 24 | [1] 29 | .. | ... | . . | ... | [1] 0 | [1] 0 | [1] 12 | [1] 15 |
| **Total Wheat and Flour †).** | | | | | | | | | | | | | | | | |
| | Thousand centals (1 cental = 100 lb) | | | | | | | | Thousand bushels of 60 lb | | | | | | | |
| | Net Exports (*) | | Net Imports (**) | | Net Exports (*) | | Net Imports (**) | | Net Exports (*) | | Net Imports (**) | | Net Exports (*) | | Net Imports (**) | |
| Portugal | — | — | 16 | 26 | — | — | 2 024 | 473 | 0 | 0 | 26 | 44 | — | — | 3 373 | 789 |
| Romania | 0 | 670 | — | — | 18 | 18,378 | — | — | 0 | 1,117 | — | — | 30 | 30,629 | — | — |
| United States | 788 | 629 | — | — | 14,745 | 21,447 | — | — | 1,314 | 1,048 | — | — | 24 575 | 35,745 | — | — |
| Argentina | 4,738 | 10,045 | — | — | 51,600 | 99,293 | — | — | 7,896 | 16,742 | — | — | 85,998 | 165,485 | — | — |
| Peru | — | — | ... | ... | — | — | [1] 1,564 | [1] 2,116 | — | — | ... | ... | — | — | [1] 2 607 | [1] 3 527 |
| **Rye.** | | | | | | | | | | | | | | | | |
| | Thousand centals (1 cental = 100 lb). | | | | | | | | Thousand bushels of 56 lb | | | | | | | |
| | Exports | | Imports | | Exports | | Imports | | Exports | | Imports | | Exports | | Imports | |
| Romania | 0 | 120 | 0 | 0 | 24 | 2,074 | 0 | 0 | 0 | 214 | 0 | 0 | 43 | 3,703 | 0 | 0 |
| United States | 0 | 2 | 129 | 0 | 136 | 410 | 779 | 0 | 0 | 4 | 230 | 0 | 244 | 732 | 1,392 | 0 |
| Argentina | 108 | 170 | — | — | 1,001 | 5,658 | — | — | 195 | 303 | — | — | 1 787 | 10,103 | — | — |
| **Barley.** | | | | | | | | | | | | | | | | |
| | Thousand centals (1 cental = 100 lb). | | | | | | | | Thousand bushels of 48 lb | | | | | | | |
| Romania | 0 | 0 | 0 | 0 | 1,138 | 2,607 | 1 | 0 | 0 | 0 | 0 | 0 | 2,370 | 5,430 | 3 | 0 |
| United States | 12 | 17 | 1 | 88 | 232 | 1,672 | 564 | 262 | 26 | 35 | 2 | 184 | 483 | 3,484 | 1,175 | 545 |
| Argentina | 77 | 31 | — | — | 2,031 | 8,680 | — | — | 160 | 64 | — | — | 4,232 | 18,083 | — | — |

(*) Excess of exports over imports. — (**) Excess of imports over exports.
(†) Flour reduced to grain on the basis of the coefficient: 1,000 centals of flour = 1,333.333 centals of grain (Thousand barrels of flour = 4,355.55 bushels of grain).
[1]) Up to March 31.

| COUNTRIES | June | | | | Eleven months (August 1-June 30) | | | | June | | | | Eleven months (August 1-June 30) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Exports | | Imports | | Exports | | Imports | | Exports | | Imports | | Exports | | Imports | |
| | 1941 | 1940 | 1941 | 1940 | 1940-41 | 1939-40 | 1940-41 | 1939-40 | 1941 | 1940 | 1941 | 1940 | 1940-41 | 1939-40 | 1940-41 | 1939-40 |
| **Oats.** | | | | | | | | | | | | | | | | |
| | Thousand centals (1 cental 100 lb.) | | | | | | | | Thousand bushels of 32 lb. | | | | | | | |
| Romania | 2 | 0 | 0 | 0 | 200 | 0 | 0 | 0 | 5 | 0 | 0 | 0 | 626 | 0 | 0 | 0 |
| United States | 5 | 3 | 197 | 542 | 48 | 62 | 2,902 | 3,269 | 14 | 10 | 617 | 1,695 | 149 | 192 | 9,070 | 10,216 |
| Argentina | 37 | 56 | ... | ... | 1,212 | 8,193 | 1) 7 | 1) 7 | 115 | 175 | ... | ... | 3,786 | 25,602 | 1) 23 | 1) 21 |
| Peru | — | — | ... | ... | — | — | 2) 33 | 2) 14 | — | — | ... | ... | — | — | 2) 103 | 2) 43 |
| **Maize.** | | | | | | | | | | | | | | | | |
| | Thousand centals (1 cental 100 lb). | | | | Eight Months (November 1-June 30) | | | | Thousand bushels of 56 lb. | | | | Eight months (November 1-June 30) | | | |
| Portugal | 7 | 0 | 213 | 25 | 7 | 0 | 1,056 | 206 | 13 | 0 | 381 | 45 | 13 | 0 | 1,886 | 367 |
| Romania | 154 | 1,220 | 0 | 0 | 2,888 | 9,746 | 0 | 0 | 275 | 2,179 | 0 | 0 | 5,156 | 17,403 | 0 | 0 |
| United States | 151 | 2,302 | 23 | 47 | 2,084 | 14,604 | 453 | 253 | 269 | 4,111 | 41 | 85 | 3,722 | 26,078 | 810 | 452 |
| Argentina | 259 | 3,062 | — | — | 9,029 | 37,721 | — | — | 463 | 5,467 | — | — | 16,123 | 67,358 | — | — |
| Peru | ... | ... | ... | ... | 2) 0 | 2) 0 | 2) 0 | 2) 0 | ... | ... | ... | ... | 2) 0 | 2) 0 | 2) 0 | 2) 0 |
| **Rice.** | | | | | | | | | | | | | | | | |
| | Thousand centals (1 cental 100 lb) | | | | Six Months (January 1-June 30) | | | | Thousand bushels of 45 lb | | | | Six Months (January 1 June 30) | | | |
| | | | | | 1941 | 1940 | 1941 | 1940 | | | | | 1941 | 1940 | 1941 | 1940 |
| Portugal | 33 | 0 | 13 | 14 | 33 | 1 | 17 | 27 | 73 | 0 | 28 | 31 | 73 | 2 | 37 | 60 |
| Romania | — | — | 10 | 37 | — | — | 33 | 224 | — | — | 22 | 81 | — | — | 73 | 498 |
| United States | 345 | 299 | 9 | 43 | 2,362 | 1,743 | 75 | 216 | 767 | 664 | 21 | 97 | 5,248 | 3,873 | 166 | 481 |
| Argentina | 0 | 1 | ... | .. | 6 | 2 | 1) 42 | 1) 21 | 0 | 3 | . | . | 14 | 5 | 1) 93 | 1) 48 |
| Peru | ... | ... | . | . | 2) 0 | 2) 0 | 2) 67 | 2) 140 | ... | ... | ... | ... | 2) 0 | 2) 0 | 2) 148 | 2) 311 |
| **Linseed.** | | | | | | | | | | | | | | | | |
| | Thousand centals (1 cental - 100 lb). | | | | | | | | Thousand bushels of 56 lb | | | | | | | |
| Portugal | — | — | 0 | 0 | — | — | 11 | 41 | — | — | 0 | 0 | — | — | 19 | 72 |
| Romania | 0 | 0 | 2 | 0 | 0 | 0 | 7 | 7 | 0 | 0 | 4 | 0 | 0 | 0 | 13 | 12 |
| United States | — | — | 485 | 292 | — | — | 4,099 | 4,450 | — | — | 866 | 521 | — | — | 7,320 | 7,947 |
| Argentina | 1,038 | 636 | ... | ... | 5,106 | 13,529 | 1) 0 | 1) 0 | 1,854 | 1,135 | ... | ... | 9 119 | 24,159 | 1) 0 | 1) 0 |
| **Cotton.** | | | | | | | | | | | | | | | | |
| | Thousand centals (1 cental — 100 lb.) | | | | Eleven months (August 1-June 30) | | | | Thousand bales of 478 lb. | | | | Eleven months (August 1-June 30) | | | |
| | | | | | 1940-41 | 1939-40 | 1940-41 | 1939-40 | | | | | 1940-41 | 1939-40 | 1940-41 | 1939-40 |
| Portugal | — | — | 22 | 20 | — | — | 395 | 531 | — | — | 5 | 4 | — | — | 83 | 111 |
| Romania | 0 | 0 | 43 | 24 | 0 | 0 | 172 | 322 | 0 | 0 | 9 | 5 | 0 | 0 | 36 | 67 |
| United States | 390 | 694 | 131 | 62 | 5,552 | 31 914 | 879 | 749 | 82 | 145 | 27 | 13 | 1,161 | 6,677 | 184 | 157 |
| Argentina | 224 | 24 | ... | ... | 649 | 433 | 1) 8 | 1) 5 | 47 | 5 | ... | ... | 136 | 91 | 1) 2 | 1) 1 |
| Peru | ... | ... | — | — | 2) 925 | 2) 1,208 | — | — | ... | .. | — | — | 2) 193 | 2) 253 | — | — |

1) Up to April 30. — 2) Up to March 31.

Thousand lb.

| COUNTRIES | June | | | | Ten months (September 1-June 30) | | | | June | | | | Six months (January 1-June 30) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Exports | | Imports | | Exports | | Imports | | Exports | | Imports | | Exports | | Imports | |
| | 1941 | 1940 | 1941 | 1940 | 1940-41 | 1939-40 | 1940-41 | 1939-40 | 1941 | 1940 | 1941 | 1940 | 1941 | 1940 | 1941 | 1940 |
| | **Wool.** | | | | | | | | **Butter.** | | | | | | | |
| Denmark | — | — | — | — | — | — | — | — | 16,535 | 27,337 | — | — | 69,005 | 159,977 | — | — |
| Portugal | 0 | 0 | 6,894 | 1,534 | 0 | 2,035 | 7,075 | 3,104 | 0 | 13 | 0 | 0 | 139 | 60 | 0 | 0 |
| Romania | 0 | 0 | 397 | 139 | 0 | 0 | 8,389 | 441 | 0 | 0 | 0 | 0 | 0 | 238 | 0 | 0 |
| United States | 0 | 366 | 84,759 | 18,675 | 4 | 481 | 616,381 | 278,694 | 187 | 280 | 176 | 71 | 1,239 | 1,305 | 1,030 | 622 |
| Argentina (a) | 31,855 | 12,106 | — | — | 293,478 | 190,295 | — | — | 996 | 3,944 | — | — | 23,865 | 13,942 | — | — |
| Argentina (b) | 13,307 | 5,335 | — | — | 79,045 | 64,962 | — | — | | | | | | | | |
| Peru | ... | ... | — | — | [2]) 7,346 | [2]) 8 272 | — | — | . . | ... | ... | .. | [2]) 0 | [2]) 0 | [2]) 68 | [2]) 53 |
| | **Cheese.** | | | | Six months (January 1-June 30) | | | | **Cacao.** | | | | Nine months (October 1-June 30) | | | |
| | | | | | 1941 | 1940 | 1941 | 1940 | | | | | 1940-41 | 1939-40 | 1940-41 | 1939-40 |
| Portugal | 9 | 22 | 7 | 0 | 148 | 139 | 15 | 26 | 62 | 0 | 115 | 119 | 62 | 29 | 1,638 | 1,118 |
| Romania | 0 | 24 | 4 | 4 | 0 | 157 | 15 | 20 | — | — | 0 | 602 | — | — | 22 | 2,619 |
| United States | 14 107 | 170 | 1,437 | 3,362 | 21,486 | 948 | 11,180 | 21,502 | — | — | 77,047 | 49,926 | — | — | 663,133 | 438,239 |
| Argentina | 3 254 | 871 | | | 14,288 | 3,038 | [2]) 0 | [2]) 7 | — | — | ... | ... | — | — | [2]) 6,883 | [2]) 5,979 |
| Peru | . | | | | [2]) 0 | [2]) 0 | [2]) 99 | [2]) 82 | — | — | ... | | — | — | [2]) 481 | [2]) 181 |
| | **Tea.** | | | | Twelve months (July 1-June 30) | | | | **Coffee.** | | | | Twelve months (July 1-June 30) | | | |
| | | | | | 1940-41 | 1939-40 | 1940-41 | 1939-40 | | | | | | | | |
| Portugal | — | | 90 | 57 | — | — | 492 | 384 | 265 | 481 | 595 | 1,812 | 3,305 | 3,754 | 15,413 | 18,682 |
| Romania | — | — | 0 | 223 | — | — | 161 | 957 | — | — | 13 | 265 | — | — | 2,551 | 5 540 |
| United States | — | — | 9,753 | 6 510 | — | — | 101,689 | 100,075 | 547 | 906 | 160,360 | 161,802 | 10 836 | 12,253 | 2526,085 | 2043,624 |
| Argentina | — | — | . | . | — | — | [2]) 2,859 | [2]) 4,308 | — | — | . . | ... | — | — | [2]) 49,225 | [2]) 47,774 |
| Colombia | — | — | — | — | — | — | — | — | .. | .. | — | — | [1]536380 | [1]448677 | — | — |
| Peru | — | — | .. | . | — | — | [2]) 1,283 | [2]) 922 | ... | | — | — | [2]) 3,779 | [2]) 5,421 | [2]) 0 | [2]) 0 |

(a) Unswashed wool — (b) Washed wool

[1]) Up to May 31 — [2]) Up to April 30 — [3]) Up to March 31

# STOCKS

## Total wheat in the United States ([1])

| Location | July 1941 | April 1941 | July 1940 | July 1939 | July 1938 | July 1941 | April 1941 | July 1940 | July 1939 | July 1938 |
|---|---|---|---|---|---|---|---|---|---|---|
| | First day of month | | | | | | | | | |
| | thousand centals | | | | | thousand bushels | | | | |
| On farms | 53,458 | 117 453 | 49 888 | 54,223 | 35,468 | 89 097 | 195;755 | 83,146 | 90,372 | 59 11[illegible] |
| In interior mills and elevators | 43 944 | 78,748 | 20 171 | 21,979 | 18,372 | 73 240 | 131,247 | 33,618 | 36,631 | 30 620 |
| Commercial wheat in store | 91,138 | 85 138 | 52,395 | 48 800 | 17,000 | 151 896 | 141,897 | 87,325 | 81,334 | 28 333 |
| In merchant mills and elevators ([2]) | 40,725 | 34 622 | 48,149 | 42,507 | 25,492 | 67 875 | 57,703 | 80,249 | 70,845 | 42 486 |
| Stored for others in merchant mills ([2]) | 15,604 | 11 383 | 6 429 | 8,510 | 7,037 | 26,007 | 18,972 | 10,715 | 14,184 | 11 728 |
| *Total U S wheat as grain* | *244,869* | *327,344* | *177,032* | *176,019* | *103,369* | *408,115* | *545,574* | *295,053* | *293,366* | *172,280* |
| Flour (in terms of grain) in merchant mills ([2]) | 12,092 | 11,756 | 12 882 | 11 066 | 10 570 | 20 154 | 19,594 | 21,470 | 18,443 | 17 61[illegible] |
| *Total U S wheat* | *256,961* | *339 100* | *189,914* | *187,085* | *113,939* | *428,269* | *565,168* | *316,523* | *311,809* | *189,89*[illegible] |
| Canadian wheat in store in bond in the U S | 20,526 | 24 429 | 13 064 | 2,804 | 469 | 34,210 | 40,715 | 21,773 | 4 673 | 781 |
| **Total wheat in the U. S. . . .** | **277,487** | **363,529** | **202,978** | **189,889** | **114,408** | **462,479** | **605,883** | **338,296** | **316,482** | **190,677** |

([1]) Incomplete data wheat in transit is not included, wheat-flour only if in mills and attached elevators — ([2]) The figures of the partial quarterly census taken by the Bureau of Census (see next table) have been adjusted to allow for stocks in all mills

## Wheat and wheat-flour held by commercial mills in the United States ([1]).

| Location | June 1941 | March 1941 | June 1940 | June 1939 | June 1938 | June 1941 | March 1941 | June 1940 | June 1939 | June 1938 |
|---|---|---|---|---|---|---|---|---|---|---|
| | Last day of month | | | | | | | | | |
| | thousand centals | | | | | thousand bushels | | | | |
| Wheat stocks, the property of commercial millers | | | | | | | | | | |
| Wheat held in mills, and mill-elevators attached to mills . . . . . . | 37,996 | 32,579 | 44,201 | 39,447 | 23,860 | 63,327 | 54,298 | 73,669 | 65,745 | 39,767 |
| Wheat in other elevators ([2]) . . . . | 7,288 | 5,453 | 9,936 | 9,921 | 4,968 | 12,147 | 9,088 | 16,560 | 16,536 | 8,280 |
| Wheat in transit to merchant mills, and bought to arrive ([3]) . . . . . . . | 9,415 | 7,788 | 8,075 | 10,463 | 5,393 | 15,692 | 12,980 | 13,458 | 17,438 | 8,988 |
| *Total* . | *54,699* | *45,820* | *62,212* | *59,831* | *34,221* | *91,166* | *76,366* | *103,687* | *99,719* | *57,035* |
| Wheat-flour in mills and warehouses, and in transit, sold and unsold | 7,842 | 7,689 | 8,219 | 7,137 | 6,876 | 4,001 | 3,923 | 4,193 | 3 641 | 3,508 |
| Wheat stored for others in mills and mill-elevators and in all other positions . . . | [5] 14,559 | [5] 10,711 | 9,801 | 12,124 | [5] 6,586 | [5] 24,265 | [5] 17,852 | 16,335 | 20,206 | [5] 10,977 |
| **Grand total ([4]) . . .** | [5] **80,541** | [5] **67,594** | **83,838** | **82,223** | [5] **50,700** | [5] **134,236** | [5] **112,656** | **139,730** | **137,039** | [5] **84,501** |

([1]) Partial census by the Bureau of Census, including mills accounting for over 90 % of the total capacity of all commercial mills — ([2]) In country elevators, in public terminal elevators and in private terminal elevators not attached to mills. — ([3]) Of the quantities given under this item only about one-third are actually in transit. — ([4]) Including flour in terms of grain — ([5]) Not including wheat stored for others outside mills and mill-elevators attached to mills

## Commercial cereals in store in Canada and the United States.

| Products and location | August 1941 | July 1941 | June 1941 | August 1940 | August 1939 | August 1941 | July 1941 | June 1941 | August 1940 | August 1939 |
|---|---|---|---|---|---|---|---|---|---|---|
| | Friday or Saturday nearest 1st of month ([1]) | | | | | | | | | |
| | thousand centals | | | | | thousand bushels | | | | |
| **Wheat:** | | | | | | | | | | |
| Canadian in Canada | ... | 259,328 | 256,940 | 153,682 | 52,856 | ... | 432,213 | 428,235 | 256,136 | 88,093 |
| U S in Canada | ... | 137 | 137 | ... | 319 | ... | 228 | 228 | ... | 531 |
| U S in the United States | 138,949 | 91,138 | 83,708 | 96,090 | 93,344 | 231,582 | 151,896 | 139,513 | 160,150 | 155,573 |
| Canadian in the United States | 18,321 | 20,526 | 20,644 | 14,147 | 4,014 | 30,535 | 34,210 | 34,406 | 23,579 | 6,690 |
| Total | ... | *371,129* | *361,429* | ... | *150,533* | ... | *618,547* | *602,382* | .. | *250,887* |
| **Rye:** | | | | | | | | | | |
| Canadian in Canada | ... | 928 | 1,347 | 1,123 | 895 | ... | 1,657 | 2,405 | 1,826 | 1,598 |
| U S. in Canada | ... | 13 | 13 | 13 | 13 | ... | 24 | 24 | 24 | 24 |
| U S. in the United States | 3,880 | 3,158 | 3,072 | 5,061 | 4,431 | 6,929 | 5,639 | 5,486 | 9,037 | 7,912 |
| Canadian in the United States | 2,630 | 2,329 | 1,898 | 1,739 | 484 | 4,696 | 4,159 | 3,390 | 3,106 | 864 |
| Total | ... | *6,428* | *6,330* | *7,836* | *5,823* | ... | *11,479* | *11,305* | *13,993* | *10,398* |
| **Barley** | | | | | | | | | | |
| Canadian in Canada | ... | 2,088 | 2,256 | 2,200 | 2,661 | ... | 4,349 | 4,700 | 4,584 | 5,543 |
| U S in Canada | ... | 0 | 5 | 0 | 7 | ... | 0 | 10 | 0 | 14 |
| U S. in the United States | 2 589 | 2 367 | 2,268 | 2 687 | 4,261 | 5,394 | 4,931 | 4,726 | 5,598 | 8,878 |
| Canadian in the United States | 72 | 40 | 5 | 579 | 5 | 149 | 84 | 10 | 1,207 | 10 |
| Total | .. | *4,495* | *4,534* | *5,466* | *6,934* | ... | *9,364* | *9,446* | *11,389* | *14,445* |
| **Oats** | | | | | | | | | | |
| Canadian in Canada | .. | 1,398 | 1,496 | 1,910 | 2,707 | ... | 4,369 | 4,675 | 5,968 | 8,459 |
| U S in Canada | .. | 29 | 46 | 6 | 13 | ... | 90 | 143 | 18 | 42 |
| U S in the United States | 1,801 | 1,250 | 1,463 | 886 | 2,017 | 5,629 | 3,906 | 4,571 | 2,769 | 6,303 |
| Canadian in the United States | 143 | 165 | 116 | 31 | 29 | 446 | 517 | 361 | 98 | 91 |
| Total | | *2,842* | *3,121* | *2,833* | *4,766* | ... | *8,882* | *9,750* | *8,853* | *14,895* |
| **Maize:** | | | | | | | | | | |
| U S in Canada | ... | 537 | 567 | ... | 2 258 | ... | 959 | .. | ... | 4,033 |
| Argentine in Canada | ... | ... | ... | ... | 2 | ... | ... | ... | ... | 4 |
| South African in Canada | . | ... | ... | ... | 129 | ... | ... | ... | . . | 231 |
| Australian in Canada | ... | ... | ... | ... | 16 | ... | . . | ... | ... | 28 |
| U S in the United States | 23,863 | 29,737 | 34,137 | 14,198 | 11,151 | 42,612 | 53,102 | 60,959 | 25,354 | 19,913 |
| Total | .. | ... | ... | ... | *13,556* | ... | . . | ... | ... | *24,209* |

([1]) Friday for Canada, Saturday for the United States.

## Cotton stocks on hand in the United States.

| Location | July 1941 | June 1941 | May 1941 | July 1940 | July 1939 | July 1941 | June 1941 | May 1941 | July 1940 | July 1939 |
|---|---|---|---|---|---|---|---|---|---|---|
| | Last day of month | | | | | | | | | |
| | thousand centals | | | | | thousand running bales (counting round as half bales) | | | | |
| In consuming establishments | 9,209 | 9,426 | 9,476 | 4,779 | 4,233 | 1,874 | 1,918 | 1,928 | 973 | 862 |
| In public storage and at compresses | 47,735 | 51,998 | 55,876 | 44,875 | 57,145 | 9,704 | 10,570 | 11,358 | 9,122 | 11,621 |
| Total | *56,944* | *61,424* | *65,352* | *49,654* | *61,378* | *11,578* | *12,488* | *13,286* | *10,095* | *12,483* |

## Carry-over of cotton in the United states.

Total stocks of cotton as on July 31, include, in addition to stocks in consuming establishments, in public storage and at compresses, published monthly, stocks in other positions, namely cotton for export on shipboard but not cleared, cotton coastwise, cotton in transit to ports, interior towns, and mills, cotton on farms, and in private storage. These stocks in other positions amounted to 625,000 running bales (3,075,000 centals) in 1941 against 500,000 bales (2,460,000 centals) in 1940, 550,000 bales (2,706,000 centals) in 1939, 625,000 bales (3,106,000 centals) in 1938 and 400,000 bales (1,954,000 centals) in 1937, making total stocks of **12,203,000, 10,596,000, 13,033,000, 11,533,000** and **4,498,000** running bales (*60,019,000, 52,114,000, 64,084,000 57,305,000* and *21,962,000* centals) respectively in the five years mentioned

## Commercial cereals and oilseeds in store in Argentina.

| Products and location | | First day of month | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | August 1941 (1) | July 1941 (1) | June 1941 (1) | August 1940 | August 1939 | August 1941 (1) | July 1941 (1) | June 1941 (1) | August 1940 | August 1939 |
| | | thousand centals | | | | | thousand bushels | | | | |
| Wheat in the ports | | 40,404 | 37,318 | 31 784 | 14 736 | (2) | 67 339 | 62,196 | 52 973 | 24 560 | (2) |
| Wheat in other positions | | 56,582 | 64 768 | 74,687 | 18,711 | (2) | 94,301 | 107,945 | 124,475 | 31 185 | (2) |
| | Total | *96,986* | *102 086* | *106 471* | *33,447* | (2) | *161,640* | *170 141* | *177 448* | *55 745* | (2) |
| Rye | | 3,792 | 3,737 | 3,855 | 4,637 | 1,398 | 6,771 | 6,673 | 6,885 | 8,281 | 2,497 |
| Barley | | 13,563 | 14,772 | 14,378 | 4 512 | 1,439 | 28,257 | 30,777 | 29 954 | 9,399 | 2,997 |
| Oats | | 1,903 | 2,280 | 2 429 | 3 239 | 3,189 | 5,946 | 7 125 | 7,592 | 10,122 | 9,966 |
| Maize in the ports | | 1,898 | 2,038 | 2 194 | 5,418 | 3,370 | 3,390 | 3,639 | 3,917 | 9 675 | 6,018 |
| Maize in other positions | | 2,134 | 2,027 | 2,026 | 6,500 | 7,117 | 3 811 | 3 620 | 3,618 | 11,606 | 12,708 |
| | Total | *4,032* | *4,065* | *4,220* | *11,918* | *10,487* | *7,201* | *7,259* | *7,535* | *21 281* | *18,726* |
| Canaryseed | | 481 | 497 | 485 | 497 | 291 | 858 | 887 | 866 | 887 | 520 |
| Linseed in the ports | | 11,546 | 9,847 | 7,681 | 3,235 | 3,320 | 20,617 | 17,584 | 13,717 | 5,777 | 5,929 |
| Linseed in other positions | | 16,991 | 18 215 | 19,755 | 2,633 | 2 667 | 30,341 | 32,527 | 35,276 | 4 702 | 4,762 |
| | Total | *28,537* | *28 062* | *27,436* | *5,868* | *5,987* | *50,958* | *50,111* | *48,993* | *10,479* | *10,691* |
| Sunflowerseed | | 5,924 | 4 723 | 2 989 | 2,645 | 1 507 | 21,156 | 16,868 | 10,673 | 9,447 | 5,381 |

(1) In the data for July and August stocks of property of the "Junta Reguladora de Granos" in the hands of merchants or industrialists are included for wheat, rye, linseed and sunflowerseed In the data for June corresponding stocks are included for wheat, rye and linseed — (2) Figures for wheat in store have been withheld by Governmental order

## PRICES FOR CEREALS OF THE NEW CROP

**Germany.**

An Order of the Reichskommissar for Prices and the Minister of Food and Agriculture, issued on June 28, 1941, fixes growers' prices for home-grown cereals during the year 1941-42. On the whole, the dispositions of the Order, issued on June 29, 1940 for the year 1940-41, remain in force. For wheat and rye, however, the monthly increases are modified to encourage the earlier supply by the producer. Instead of the regular monthly increases beginning on August 1, the base prices have been increased as from August 1 by RM 1.00 per quintal. Other increases follow on December 1, January 1 and February 1, while there are reductions as from April 1 onwards.

The division of the country into price regions (*Preisgebiete*) as well as the dates of beginning of the season (July 1 for rye and fodder barley, July 16 for wheat, August 16 for fodder oats) are the same as last year. Basic prices and the increase of RM 3.00 of the wheat-price in the *Ostmark* remain unchanged.

We reproduce below the prices in RM per quintal for the region which includes Berlin.

| Period | Wheat | | Rye | | Fodder barley | | Fodder oats | |
|---|---|---|---|---|---|---|---|---|
| | 1939-40 and 1940-41 | 1941-42 | 1939-40 and 1940-41 | 1941-42 | 1939-40 and 1940-41 | 1941-42 | 1939-40 | 1940-41 and 1941-42 (1) |
| July 1-15 | — | — | 17.70 | 17.70 | 16.20 | 16.20 | - | |
| July 16-31 | 19.40 | 19.40 | 17.70 | 17.70 | 16.20 | 16.20 | - | |
| August 1-15 | 19.60 | 20.40 | 17.90 | 18.70 | 16.40 | 16.40 | — | — |
| August 16-31 | 19.60 | 20.40 | 17.90 | 18.70 | 16.40 | 16.40 | 17.10 | 17.80 |
| September | 19.80 | 20.40 | 18.10 | 18.70 | 16.60 | 16.60 | 17.20 | 17.90 |
| October | 20.00 | 20.40 | 18.30 | 18.70 | 16.80 | 16.80 | 17.30 | 18.00 |
| November | 20.20 | 20.40 | 18.50 | 18.70 | 17.00 | 17.00 | 17.40 | 18.10 |
| December | 20.40 | 20.60 | 18.70 | 18.90 | 17.20 | 17.20 | 17.50 | 18.20 |
| January | 20.60 | 20.80 | 18.90 | 19.10 | 17.40 | 17.40 | 17.60 | 18.30 |
| February | 20.80 | 21.00 | 19.10 | 19.30 | 17.60 | 17.60 | 17.70 | 18.40 |
| March | 21.00 | 21.00 | 19.30 | 19.30 | 17.70 | 17.70 | 17.80 | 18.50 |
| April | 21.20 | 20.80 | 19.50 | 19.10 | 17.80 | 17.80 | 17.90 | 18.60 |
| May | 21.40 | 20.80 | 19.70 | 18.70 | 17.90 | 17.90 | 18.00 | 18.70 |
| June | 21.60 | 20.60 | 19.90 | 18.70 | 18.00 | 18.00 | 18.10 | 18.80 |
| July 1-15 | 21.80 | 20.60 | — | — | — | — | 18.10 | 18.80 |
| July 16-31 | — | - | — | — | — | - | 18.10 | 18.80 |
| August 1-15 | — | - | - | — | — | — | 18.10 | 18.80 |

(1) Including a supplement of 0.70 RM per quintal for compulsory delivery to the Army.

These prices are for

*wheat*, specific weight of 75 to 77 kg;
*rye*, specific weight of 70 to 72 kg;
*fodder barley*, specific weight of 56 to 60 kg,
*fodder oats*, specific weight of 46 to 48 kg.

Increases or reductions for specific weight superior or inferior to that established have been provided for by the Order.

**Belgium.**

An Order of the General Secretary of the Ministry of Food and Agriculture and the Commissioner of Prices and Wages, issued on July 31, 1941, fixes maximum selling-prices for home-grown cereals for the year 1941-42. The prices are, in Belgian francs per net quintal:

| PERIOD | Wheat | Rye | Spelt |
|---|---|---|---|
| Up to October 5, 1941 | 220 | 210 | 195 |
| October 6-November 30, 1941 | 210 | 200 | 185 |
| December 1, 1941-January 4, 1942 | 205 | 195 | 180 |
| As from January 5, 1942 | 200 | 190 | 175 |

*Winter-* and *spring barley*, francs 185 per net quintal;
*Oats*: francs 180 per net quintal.

These prices are for produce of good quality, sound and merchantable, delivered f.o.r.: (*a*) at the nearest shipping point; (*b*) at the warehouse of the agreed merchant or manufacturer in as far as this warehouse is not more distant than the producer's shipping point.

**Bulgaria.**

The Cabinet Council has fixed the prices which will be paid by the Direction of Purchase and Export of Cereals for monopolised agricultural products of the 1941 crop. These prices are as follows:

| | |
|---|---|
| *Ordinary wheat* | lewa 520 per quintal; |
| *Hard wheat* | ,, 530 ,, ,, ; |
| *White wheat* | ,, 530 ,, ,, ; |
| *Rye* | ,, 420 ,, ,, ; |
| *Ordinary barley* | ,, 380 ,, ,, ; |
| *2-rowed barley* | ,, 410 ,, ,, ; |
| *Oats* | ,, 400 ,, ,, . |

**Croatia.**

The Government has fixed growers' prices for home grown wheat for the year 1941-42 as follows:

*Wheat*, specific weight 78 kg., 450 kunas per quintal;
*Rye* and *other cereals*, from 420 to 430 kunas per quintal.

**Denmark.**

An Order of the Ministry of Agriculture and Fisheries, issued on July 10, 1941, establishes again the obligatory stocking of cereals and fixes at the same time the prices to pay to the producers for all quantities of cereals deriving from the new crop. Except some slight modifications, the dispositions of the new Order correspond to the Order of July 25, 1940 (See this Crop Report, November 1940, p. 697).

The base prices are as follows:

| | | | |
|---|---|---|---|
| *Wheat*, specific weight 128 Dutch pounds . | Danish crowns | 28.00 | per quintal; |
| *Rye*, specific weight 118 Dutch pounds . . | ,, ,, | 29.00 | ,, ,, ; |
| *Barley*, specific weight 112 Dutch pounds . | ,, ,, | 25.00 | ,, ,, ; |
| *Oats*, specific weight 85 Dutch pounds . . | ,, ,, | 25.00 | ,, ,, ; |
| *Meslin* of barley and oats . . . . . . . . | ,, ,, | 25.00 | ,, ,, . |

These prices are for good quality produce, sound, sufficiently clean and dry, at merchant's warehouse, mill or depot of the Union for Concentrated Feedingstuffs or f.o.r. producer's station or on board in harbour.

The Wheat Office pays a supplement of 1 crown per quintal for lots of cereals offered or sold f.o.r. warehouse or station. Furthermore, a transport supplement is given of at maximum öre 3 per kilometer surpassing a distance of 3 kilometers from the producer's holding to the spot of delivery.

In regard to the indicated specific weight, augmentations up to 3 pounds and diminuitions up to 5 pounds with a corresponding rise or deduction of öre 15 for each pound more or less, are allowed. For merchandise blended with other cereals or otherwise deteriorated or with a specific weight under the allowed minimum of 5 pounds, the price must be reduced proportionally.

**France.**

The Government has fixed growers' prices for home-grown cereals for the year 1941-42:

| | | | |
|---|---|---|---|
| *Wheat* . . . . . . . . . . . . . . . . . . | francs | 290 | per quintal; |
| *Rye* . . . . . . . . . . . . . . . . . . | ,, | 245 | ,, ,, |
| *Barley* . . . . . . . . . . . . . . . . . | ,, | 230 | ,, ,, |
| *Oats* . . . . . . . . . . . . . . . . . . | ,, | 215 | ,, ,, |
| *Buckwheat* . . . . . . . . . . . . . . . | ,, | 270 | ,, ,, ; |
| *Maize* . . . . . . . . . . . . . . . . . | ,, | 280 | ,, ,, . |

These prices are valid for August and September; as from October 1941 to July 1942, included, they are increased by franc 1.50 per month for wheat and by franc 1.00 per month for the other cereals.

A premium of francs 11 per quintal is paid for quantities of wheat delivered immediately.

## Greece.

The Cabinet Council has established dispositions for the purchase of the 1941 crop. As last year, it will be accomplished by the Governmental Organisation of Purchase, which has been furthermore completed. At the same time the Cabinet Council has fixed growers' prices for home-grown cereals, as follows:

| | |
|---|---|
| *Wheat* . . . . . . . . . . . . . . | drachma 14 per oka (= 1.34 liter); |
| *Rye* . . . . . . . . . . . . . . . | ,, 11 ,, ,, ; |
| *Barley* . . . . . . . . . . . . . . | ,, 10 ,, ,, . |

Experts of the Ministry of Agriculture together with representatives of the Organisation of Reconstruction will estimate and registrate the probable results of the crop in order to avoid the retention by producers of quantities not allowed to them. At the same time dispositions regarding the transport of the crop to the warehouses of the Organisation have been taken into consideration.

## Hungary.

An Order of the Government, issued on July 5, 1941, regulates the marketing of cereals and flour for the year 1941-42.

Growers' prices, fixed up to July 31, 1942, are per quintal:

*Wheat*, merchantable quality, specific weight 78 kg, pengö 30.00, f.o.r. every station of the country.

*Rye*, merchantable quality, specific weight 71 kg, pengö 28.00, f.o.r. every station of the country.

*Fodder barley*, 1st quality, specific weight at least 65 kg:

| | | | | |
|---|---|---|---|---|
| Pengö | 24.50, | f.o.r. | stations | Budapest, Dés, Marosvásárhely, Sopron; |
| ,, | 24.30, | ,, | ,, | Szeged; |
| ,, | 24.20, | ,, | ,, | Nagyvárad; |
| ,, | 24.00, | ,, | ,, | Györ, Kaposvár, Nyíregyháza. |

The price for fodder-barley of average quality is 1 pengö per quintal less.

*Barley, husked:* base price as from September 1, 1941, pengö 32.00, f.o.r. every station of the country. As from October 1, 1941 until June 1, 1942, included, this price is increased by pengö 0.20 per month.

*Fodder oats*, specific weight at least 41 kg:

| | | | | |
|---|---|---|---|---|
| Pengö | 26.50, | f.o.r. | stations | Budapest, Kolosvár, Marosvásárhely, Szeged; |
| ,, | 26.20, | ,, | ,, | Szombathely; |
| ,, | 26.00, | ,, | ,, | Debrecen et Komárom; |
| ,, | 25.70, | ,, | ,, | Székesfehérvár; |
| ,, | 25.50, | ,, | ,, | Kassa, Miskolc, Pécs. |

The Order provides for increases or reductions in case of specific weight higher or lower than that indicated. Besides, deductions of transport costs in case of delivery to stations or other spots of delivery not indicated in this table, are taken into account for barley and fodder oats.

The price for quantities of wheat and rye, delivered after October 31, is 10 per cent. less, while last year it rose from a minimum at the beginning to a maximum at the close of the commercial season.

**Italy.**

In the May number of this Crop Report, p. 252, we gave some details about the regulation of prices for cereals and beans (*fave*) for the year 1941-42, as well as data regarding premiums for earlier delivery of soft and hard wheat to the Governmental depots (*ammassi*) According to a disposition of the Minister of Agriculture and Forestry, issued on July 23, the payment of premiums for merchandise delivered earlier to these depots, additional to the first supplement paid out of Government funds, will be extended to other products.

These premiums are.

| | | | | |
|---|---|---|---|---|
| *Rye, barley, oats* and *unhusked rice* . . . . | lire | 16 | per | quintal; |
| *Maize* . . . . . . . . . . . . . . . . . . . . . | ,, | 15 | ,, | ,, |
| *Broad beans* (fave) . . . . . . . . . . . . . | ,, | 20 | ,, | ,, |

Consequently, the prices for products delivered at the time established to the Governmental depots will be:

| | | | | |
|---|---|---|---|---|
| *Rye*, 68 kg. per hl., 1 % impurities . . . | lire | 166 | per | quintal, |
| *Barley*, 56 kg. per hl., 2 % impurities. . . | ,, | 161 | ,, | ,, |
| *Oats*, 42 kg. per hl., 1 % impurities . . . | ,, | 151 | ,, | ,, |
| *Maize* . . . . . . . . . . . . . . . . . . . | ,, | 135 | ,, | ,, |
| *Broad beans*, current quality, 4 % impurities | ,, | 180 | ,, | ,, |

**Norway.**

The Board of Prices has fixed growers' prices for home-grown cereals for the year 1941-42:

| | | | | |
|---|---|---|---|---|
| *Wheat* and *rye*. . . . . . . . | Norwegian | crowns | 35 | per quintal, |
| *Barley* . . . . . . . . . . . . | ,, | ,, | 31 | ,, |
| *Oats* and *meslin* . . . . . . | ,, | ,, | 28 | ,, |

**Netherlands.**

In the May number of this Crop Report, p. 252, we indicated the fixed prices to be paid to agriculturists for the produce of the 1941 crop. The following addenda to the list given have to be made·

*Barley*, approved of as brewing barley: a supplement of 0.50 florin per quintal;

| | |
|---|---|
| *Maize*. . . . . . . . . | 11.00 florins per quintal (instead of fl. 13.25); |
| *Buckwheat* . . . . . . | 10.00 ,, ,, ,, ; |
| *Meslin* . . . . . . . . | 9.00 ,, ,, ,, . |

Last year a storage supplement was given which was increased by 3 cents from week to week. As from the week commencing on April 28, this increase was no more calculated. For the 1941 crop this supplement has been reduced to 1 1/2 cent and the weekly increase is only given up to February 28, 1942. Furthermore, a premium for early threshing is given; it amounts to florins 0.30 per quintal for deliveries before November 30.

**Portugal.**

The decree-law of August 11, 1938 (1), establishing the new regulation of cereals, fixed growers' prices for *wheat* for 1938-39 and the following years. These prices were for soft wheat, specific weight 81 kg., 2 per cent. impurities, 152 $ 05 per quintal and for hard wheat, with the same specific weight, 147 $ 05 per quintal. For lower hectoliter weights a price reduction of 1 $ 60 was calculated for each kg less, which brought the price for soft and hard wheat with a specific weight of 73 kg at 139 $ 25 and 134 $ 25 respectively.

These prices which were in force in the continental provinces of the country, were for merchantable quality produce, delivered at nearest shipping point. They were valid for the months of August and September and were increased until June of the following year by 1 $ 30 per month. The price of July was the same as that of June.

According to a decree-law of the Minister of Economics, issued on August 6, 1941, the prices indicated above remain in force also for the year 1941-42; they will be increased, however, by a cultivation premium amounting to 17 $ 50 per quintal of new wheat. Furthermore, the tax of 2 $ 50 per quintal, paid by the producers since 1936, as been abolished. Consequently, the increase of the wheat price, compared with that of last year, amounts practically to 20 $ 00 per quintal of new wheat.

A similar regulation has been adopted, by decree of August 8, 1941, for ***rye***. Every producer or holder of rye must indicate his entire crop and his stocks to the Agricultural Corporation (*Gremios da Lavoura*) or to the delegations of the

(1) See: Annuaire International de Législation Agricole, 1939, p. 213 et seq.

National Union of Wheat Producers (F. N. P. T.) not later than September 30. On the other hand, the F. N. P. T. is obliged to purchase all quantities available of rye and to take care of its distribution to the mills.. The price, f. o. r. warehouse of the F. N. P. T., amounts for rye, specific weight 77 kg, 3 per cent. impurities, to 119 $ 10, a reduction of 1 $ 20 being applied for each kg which the hectoliter weight remains under 77, thus bringing the price of rye, 70 kg per hl., at 110 $ 70 per quintal.

These prices are valid for July, August and September, as from October 1941 up to June 1942, included, they are increased by 1 $ 00 per month.

For both wheat and rye, reductions are prescribed for merchandise containing too much impurities, affected by diseases or otherwise deteriorated.

## Rumania.

An Order of the Undersecretary of Food, issued on July 21, establishes the obligation for every producer or holder of cereals to indicate all quantities at hand, as well as those needed for sowings and consumption on the holding and those available for sale, not later than August 30.

As from July 17, the price of new *wheat* with a specific weight of 75 kg and 3 per cent. impurities is fixed at lei 1,100 per quintal, f.o.r. producer's station.

According to another Order of the Undersecretary of Food, issued on June 12, 1941, the price for horse-tooth *maize* fixed by Order of May 24, 1941, remains in force: lei 720 per quintal, f o.r. producer's station with 16 per cent. humidity and not more than 3 per cent. of grains affected by rust or otherwise deteriorated. This price is increased by lei 108 for the varieties " Pignoletto " and " Cinquantino " and by lei 72 for the variety " Hănganese ", with the same percentage of humidity and impurity.

The increases and reductions for higher or lower specific weight as well as for every per cent. less or more impurities remain the same as last year:

*Wheat*, 1 per cent. more or less than the base price for each kg higher or lower specific weight than indicated, as well as for each per cent. less or more impurities than indicated.

*Mais*, 1 per cent. more or less than the base price for each degree of humidity less or more than indicated and 1 per cent. less for each per cent. of grains affected by rust or other deterioration more than that indicated.

## Serbia.

The Serbian Central of Cereals has fixed puchasers' price for new wheat with a specific weight of 78 kg, at dinar 350 per quintal. In the Banat this price is valid for wheat with a specific weight of 79 kg. It is f.o.r. producer's station or other shipping point or at warehouse. Millers, who buy their wheat directly from the producer must pay dinar 412 per quintal.

**Sweden.**

Cereal prices have been established according to the same system as was applied last year. Fixed prices will be paid for the surpluses offered before a certain date to the Swedish Cereal Company Ltd. (Svenska Spannmåls A. B.). For the 1941 crop the offer must be made before March 1, 1942. In that case, prices for average quality, delivered at the centres indicated by the said Company are:

| | | | | |
|---|---|---|---|---|
| *Wheat* . . . . . . . . . . . | Swedish crowns | 27.00 | per quintal; | |
| *Rye* . . . . . . . . . . . | ,, ,, | 27.00 | ,, ,, | ; |
| *Barley* . . . . . . . . . . . | ,, ,, | 26.00 | ,, ,, | ; |
| *Meslin* . . . . . . . . . . . | ,, ,, | 24.00 | ,, ,, | ; |
| *White oats* . . . . . . . . . | ,, ,, | 22.50 | ,, ,, | ; |
| *Black oats* . . . . . . . . . | ,, ,, | 21.50 | ,, ,, | . |

A supplement of 2 crowns will be paid per quintal of spring wheat.

Furthermore, with a view to increasing sowings, supplements for areas sown will be given.

**Switzerland.**

An Order of the Federal Department of Economics and the Federal Office for War and Food, which came into force on July 1, 1941, obliges the producers or holders of cereals to deliver all quantities of the 1941 crop destined to human nutrition or stock-feeding as well as stocks kept from preceding years. Producers are allowed to retain for the needs of their household and their agricultural holding (sowings, feeding of animals, etc.) such quantities as may be necessary until the moment that the 1942 crop becomes available. If after the delivery of their food-cereals, producers lack sufficient feeding-stuffs, they are allowed to ask for quantities of feeding cereals from the Federation. The cereals to be delivered are taken over by the Government at prices established by the Federal Council. As from April 1941 and until new order these prices are:

*Wheat*, Standard I (Montcalme), II (Plantahof) and III (Huron), Swiss francs 45.50, 47.00 and 48.00 per quintal respectively;

| | | | | |
|---|---|---|---|---|
| *Rye* . . . . . . . . . . . . . . | Swiss francs | 43.50 | per quintal; | |
| *Meslin* . . . . . . . . . . . . | ,, ,, | 44.50 | ,, ,, | ; |
| *Barley* . . . . . . . . . . . . | ,, ,, | 40.50 | ,, ,, | ; |
| *Oats* . . . . . . . . . . . . . | ,, ,, | 40.00 | ,, ,, | ; |
| *Maize* . . . . . . . . . . . . | ,, ,, | 43.00 | ,, ,, | . |

# PRICES BY PRODUCTS.

## A) — Spot quotations. [1]

| Description | August 8, 1941 | August 1, 1941 | July 25, 1941 | July 18, 1941 | Monthly averages: July 1941 | Monthly averages: August 1940 | Monthly averages: August 1939 | Yearly averages: 1939-40 [2] | Yearly averages: 1938-39 [2] |
|---|---|---|---|---|---|---|---|---|---|
| **Wheat** | | | | | | | | | |
| Chicago. No. 2 Hard Winter (cents p. 60 lb.) | 107 7/8 | 103 | 103 3/4 | 100 1/8 | 103 1/2 | 73 1/8 | 69 | 92 7/8 | 70 3/4 |
| Minneapolis (cents per 60 lb.): | | | | | | | | | |
| No. 1 Northern | 105 | 101 3/8 | 99 5/8 | 96 3/4 | 99 1/4 | 71 3/4 | 71 3/4 | 91 1/8 | 74 5/8 |
| No. 2 Amber Durum | 97 3/8 | 94 3/8 | 90 1/8 | 90 1/8 | 91 3/8 | 65 1/2 | 68 1/4 | 80 3/4 | 68 3/8 |
| New York. (cents p. 60 lb.): | | | | | | | | | |
| No. 1 Manitoba Northern (c. i. f.) | 91 | 88 7/8 | 91 1/2 | 92 1/2 | 91 1/8 | 83 5/8 | 73 1/8 | 92 1/4 | 73 5/8 |
| No. 2 Hard Winter (f. o. b.) | 131 5/8 | 125 | 125 1/2 | 122 7/8 | 125 5/8 | 89 3/4 | 88 1/4 | 112 1/4 | 84 3/4 |
| Buenos-Aires (a): No. 2 Hard, 78 kg. per hl. (paper pesos p. 100 kg.) | 7.05 | 6.95 | 7.00 | 7.00 | 6.96 | 8.36 | 7.00 | 7.66 | 6.89 |
| **Rye.** | | | | | | | | | |
| Minneapolis No. 2 rye (cents p. 56 lb.) | 63 1/4 | 63 5/8 | 57 1/8 | 52 1/8 | 55 1/4 | 40 5/8 | 41 1/8 | 56 1/8 | 44 |
| New York: No. 2 (c. i. f., cents p. 56 lb.) | 89 | 80 3/8 | 73 1/4 | 71 1/4 | 72 1/8 | 59 1/4 | ... | 77 5/8 | 59 1/4 |
| **Barley.** | | | | | | | | | |
| Chicago Feeding (on sample; cents p. 48 lb.) | 48 | 46 1/2 | 45 | 47 1/4 | 47 1/8 | 41 3/8 | 37 7/8 | 42 1/4 | 40 5/8 |
| Minneapolis: No. 2 Feeding (cents p. 48 lb.) | n. q. | n. q. | n. q. | n. q. | n. q. | 39 7/8 | 35 3/4 | 45 | 40 7/8 |
| New York: No. 2 (cents p. 48 lb.) | 66 1/4 | 61 7/8 | 63 1/2 | 66 1/4 | 65 1/4 | 57 1/2 | ... | 62 5/8 | 56 1/8 |
| **Oats.** | | | | | | | | | |
| Chicago: No. 2 White (cents per 32 lb.) | 38 5/8 | 35 3/4 | 34 1/2 | 34 1/2 | 36 5/8 | 30 7/8 | 31 3/8 | 39 | 30 7/8 |
| Buenos-Aires (a) No. 2 White, 49 kg. p. hl. (paper pesos per 100 kg.) | 4.50 | 4.50 | 4.50 | 4.50 | 4.50 | n. q. | 4.14 | * 5.17 | 4.81 |
| **Maize.** | | | | | | | | | |
| Chicago: No. 3 Yellow (cents p. 56 lb.) | 75 1/4 | 73 3/4 | 73 1/2 | 73 1/2 | 73 3/4 | 64 7/8 | 44 | 53 1/4 | 51 1/2 |
| New York: No. 2 Mixed Western (cents p. 56 lb.) | 91 5/8 | 89 | 89 1/4 | 88 1/2 | 88 3/8 | 79 3/4 | ... | 72 3/4 | 63 5/8 |
| **Linseed.** | | | | | | | | | |
| Buenos-Aires (a): No. 1; 4 % impurities (paper pesos p. 100 kg.) | 9.80 | 9.50 | 9.85 | 9.85 | 9.77 | * 10.60 | 14.43 | * 13.64 | 15.12 |
| London (c. i. f., shipping current or following month; £ per long ton): | | | | | | | | | |
| La Plata | 12-7-6 | 12-7-6 | 12- 7-6 | 12-10-0 | 12- 6-10 | n. q. | 11-7-10 | *14- 2-0 | *12- 2-3 |
| Bombay | 21-5-0 | 21-5-0 | 20-15-0 | 19-15-0 | 19-13- 1 | 17-2-6 | 13-1- 3 | 18-11-9 | *14-10-3 |
| Minneapolis: No. 1 Northern (cts. p. 56 lb.) | 187 1/2 | 192 | 187 1/2 | 186 | 189 7/8 | 149 7/8 | 153 | 178 | 180 |
| **Cotton.** | | | | | | | | | |
| New Orleans: Middling (cents p. lb.) | 16.24 | 15.89 | 16.72 | 15.45 | 15.42 | 9.92 | 8.97 | n. 10.03 | 8.75 |
| New York: Middling (cents per lb.) | 17.21 | 16.88 | 17.70 | 16.43 | 16.39 | 10.05 | 9.34 | n. 10.34 | 9.00 |

* Indicates that the product was not quoted during part of the period under review. — n. q. = *not quoted.* — n. = *nominal.* — (a) Thursday prices.

(1) In relation to Government price fixing, numerous series are omitted from this table; notes concerning them are given on page 413 of this issue of the Crop Report — (2) Commercial season: August-July, except for maize: May-April, and for linseed: calendar year.

## *B*) — Quotations for future delivery.

| Description | August 8, 1941 | August 1, 1941 | July 25, 1941 | July 18, 1941 | Monthly averages: July 1941 | Monthly averages: August 1940 | Monthly averages: August 1939 | Monthly averages: August 1938 | Monthly averages: August 1937 |
|---|---|---|---|---|---|---|---|---|---|
| **Wheat.** | | | | | | | | | |
| Winnipeg (cents p. 60 lb.): | | | | | | | | | |
| delivery July | — | — | 74 3/4 | 76 | 74 5/8 | — | — | — | — |
| „ October | 76 | 73 7/8 | 76 5/8 | 78 1/4 | 76 7/8 | 73 5/8 | 53 5/8 | 68 7/8 | 125 5/8 |
| „ December | 77 3/4 | 75 1/2 | 78 | 79 1/2 | 79 | 74 5/8 | 54 7/8 | 68 1/4 | 122 3/8 |
| „ May | 82 | — | — | — | — | — | 58 1/8 | 71 1/8 | 123 3/4 |
| Chicago (cents. p. 60 lb): | | | | | | | | | |
| delivery July | — | — | — | 100 7/8 | * 103 3/8 | — | — | — | — |
| „ September | 112 1/4 | 106 | 106 1/4 | 103 | 105 1/4 | 72 1/8 | 65 3/4 | 63 3/4 | 109 3/4 |
| „ December | 115 /8 | 108 3/8 | 108 | 104 7/8 | 106 7/8 | 73 3/4 | 65 3/4 | 65 3/8 | 110 3/8 |
| „ May | 119 1/8 | 110 5/8 | 109 3/4 | — | — | 74 7/8 | 66 1/4 | 67 | 112 1/4 |
| Buenos Aires (paper pesos p. 100 kg): | | | | | | | | | |
| delivery August | — | — | 6.76 | 6.77 | 6.83 | — | 7 00 | * 7 64 | — |
| „ September | 6 81 | 6 80 | 6,80 | 6.84 | 6.90 | * 8 22 | 7 00 | 7 48 | 13 64 |
| „ October | 6 88 | 6.86 | — | — | — | * 8 44 | 7.00 | 7 53 | 13 26 |
| **Rye.** | | | | | | | | | |
| Winnipeg (cents p. 56 lb.): | | | | | | | | | |
| delivery July | — | — | 53 | 53 5/8 | 54 3/4 | — | — | — | — |
| „ October | 57 1/8 | 53 7/8 | 54 1/2 | 55 1/8 | 55 1/8 | 42 1/2 | 37 5/8 | 41 | 87 3/8 |
| „ December | 58 | 54 1/2 | 55 | 55 3/4 | 55 1/8 | 43 1/4 | 38 5/8 | 41 5/8 | 85 1/2 |
| „ May | 61 3/4 | — | — | — | — | — | 40 7/8 | 43 3/4 | 86 3/4 |
| Chicago (cents p 56 lb.): | | | | | | | | | |
| delivery July | — | — | — | 56 3/4 | * 55 1/8 | — | — | — | — |
| „ September | 70 | 64 5/8 | 59 1/4 | 57 1/4 | 58 4/8 | 39 5/8 | 40 1/4 | 48 3/4 | 80 1/4 |
| „ December | 73 7/8 | 68 1/8 | 62 1/2 | 59 7/8 | 60 7/8 | 42 5/8 | 42 1/2 | 48 1/4 | 78 5/8 |
| „ May | 78 3/8 | 72 1/8 | 65 3/4 | — | — | 45 5/8 | 44 5/8 | 45 7/8 | 79 1/4 |
| **Barley.** | | | | | | | | | |
| Winnipeg (cents p. 48 lb.): | | | | | | | | | |
| delivery July | — | — | 51 3/4 | 55 | 54 | — | — | — | — |
| „ October | 51 1/4 | 48 1/4 | 48 1/2 | 48 1/4 | 47 3/8 | 33 3/8 | 34 5/8 | 39 | 57 7/8 |
| „ December | 50 3/4 | 46 7/8 | 46 7/8 | 46 3/8 | 45 7/8 | 32 7/8 | 33 7/8 | 39 1/4 | 56 5/8 |
| „ May | 51 7/8 | — | — | — | — | — | 35 1/8 | 40 7/8 | 54 5/8 |
| Minneapolis (cents p. 48 lb.): | | | | | | | | | |
| delivery September | ... | ... | ... | ... | .. | 33 1/8 | 31 | 34 3/8 | 49 3/8 |
| „ December | ... | ... | ... | ... | ... | 35 1/8 | 32 1/8 | 34 | 48 |
| **Oats.** | | | | | | | | | |
| Winnipeg (cents p. 34 lb): | | | | | | | | | |
| delivery July | — | — | 39 1/8 | 40 | 39 7/8 | — | — | — | — |
| „ October | 41 7/8 | 38 1/4 | 37 1/8 | 36 1/2 | 36 3/8 | 28 3/4 | 27 7/8 | 31 1/4 | 47 1/4 |
| „ December | 39 5/8 | 35 1/2 | 34 3/4 | 33 3/4 | 34 | 26 7/8 | 27 1/4 | 29 3/4 | 44 5/8 |
| „ May | 40 | — | — | — | — | 28 | 28 5/8 | — | 44 3/4 |
| Chicago (cents p. 32 lb.): | | | | | | | | | |
| delivery July | — | — | — | 33 7/8 | * 36 1/8 | — | — | — | — |
| „ September | 42 | 38 1/8 | 37 3/4 | 35 1/2 | 37 3/8 | 28 3/8 | 28 5/8 | 23 1/4 | 29 1/8 |
| „ December | 44 3/8 | 40 | 39 1/2 | 37 1/4 | 38 1/8 | 29 | 28 1/4 | 24 | 29 1/2 |
| „ May | 47 1/2 | 41 1/2 | 41 3/4 | — | — | 29 7/8 | 28 7/8 | 25 3/8 | 31 1/8 |

Indicates that the product was not quoted during part of the period under review.

| Description | August 8, 1941 | August 1, 1941 | July 25, 1941 | July 18, 1941 | Monthly averages | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | July 1941 | August 1940 | August 1939 | August 1938 | August 1937 |
| **Maize.** | | | | | | | | | |
| Chicago (cents p. 56 lb.): | | | | | | | | | |
| delivery July | — | — | — | 72 7/8 | * 73 1/4 | — | — | — | — |
| „ September | 78 3/4 | 75 3/4 | 75 1/2 | 74 7/8 | 75 3/8 | 60 3/4 | 43 | 52 5/8 | 97 |
| „ December | 82 | 78 5/8 | 78 | 77 5/8 | 77 7/8 | 56 1/8 | 42 5/8 | 49 7/8 | 65 1/16 |
| „ May | 85 7/8 | 81 | 80 1/2 | — | — | 57 1/2 | 45 3/8 | 52 1/8 | 66 3/8 |
| **Linseed.** | | | | | | | | | |
| Winnipeg (cents per 56 lb.): | | | | | | | | | |
| delivery July | — | — | 157 3/4 | 157 1/2 | 158 5/8 | — | — | — | — |
| „ October | 144 1/4 | 140 1/2 | 148 1/2 | 151 3/4 | 151 | 133 3/8 | 131 5/8 | 141 3/4 | 175 3/8 |
| „ December | 143 1/4 | 140 1/2 | 146 1/2 | 149 3/4 | 148 7/8 | — | 127 3/4 | — | 175 1/8 |
| Duluth (cents p. 56 lb.): | | | | | | | | | |
| delivery September | ... | ... | ... | ... | ... | n. 149 1/8 | 150 1/2 | 170 1/4 | 198 3/4 |
| Buenos Aires (paper pesos p. 100 kg.): | | | | | | | | | |
| delivery August | — | — | 9.95 | 9.89 | 10.01 | — | * 14.42 | — | — |
| „ September | 10.23 | 10.05 | 10.12 | 10.04 | 10.21 | * 13.00 | 14.51 | 13.68 | 15.89 |
| „ October | 10.43 | 10.21 | — | — | — | * 13.14 | 14.50 | 13.62 | 15.84 |

Indicates that the product was not quoted during part of the period under review.

## *APPENDIX*

## THE 1939 AGRICULTURAL CENSUS IN DENMARK

The agricultural census was taken in Denmark on July 15, 1939 through the local authorities and by utilising questionnaires in which were inserted data relating to each single holding.

The total number of holdings covered by the census was 212,820, with a total area of 3,250,408 hectares of agricultural land; nearly all these holdings, viz. 211,718, with some 3,250,100 hectares, had an area of agricultural land of at least 0.55 hectares.

The census covered agricultural labour, the utilisation of the soil and the amounts of livestock.

To the data upon these questions supplied by the 1939 census have been added, in the following tables, also those relating to the production of the principal crops, as shown in the yearly statistics the same year; to the quantity of wood cut in the forests and plantations during the financial year 1938-39, as supplied by the Danish Bureau of Statistics; to the consumption of artificial fertilizers during the period going from July 1, 1938 to June 30, 1939, as supplied by the same Bureau; to the breed of stallions used for coverings within the period comprised between June 29, 1939 and June 29, 1940, according to the 1940 agricultural census, also as supplied by the Danish Bureau of Statistics.

Tables 1 and 2 contain data relating to agricultural labour in holdings of 0.55 hectares or more, distributed according to categories, and, for certain categories, according to sex and age as well. As far as holders and temporary labour are concerned, the figures in the tables do not state the number of persons, but the total of years of work supplied by people belonging to either of these categories.

As to the holders, it has been admitted on principle that the total amount of work supplied by husband and wife makes up one year of work (of 300 days), so that, if all farmers were married, and did not use any part of their time in working in other farms, the amount of years of work supplied by them would be equal to the number of holdings of 0.55 hectares or more (211,718). However, according to the census returns, some 16 per cent of the holders are not married, and therefore the number of years of work has to be reduced by 33,438. Besides, the holders, as stated by them at the time of the census, do work in other farms for a total number of days that make up 7,533 years. Thus we obtain a total of 170,747 years of work used by the holders in working in their own holdings.

As to temporary labour, the census schedule contained a question as to the total number of days during which, between July 15, 1938 and July 15, 1939,

each holding had used outside labour. The total number of these days of work has been converted into years of 300 days.

1. — *Farm labour in holdings with 0,55 hectare and more of agricultural land.*

| Classification | Males | Females | Total |
|---|---|---|---|
| *A*) Permanent labour: | | | |
| I. – Holders | — | — | 1) 170,747 |
| II. – Members of holders families | 61,749 | 46,312 | 108,061 |
| III. – Persons not members of holders' families: | | | |
| (*a*) boarded | 109,956 | 45,899 | 155,855 |
| (*b*) not boarded | 15,029 | 7,964 | 22,993 |
| *Total* | *124,985* | *53,863* | *178,848* |
| *Total permanent labour* | — | — | *457,656* |
| *B*) Temporary labour | — | — | 1) 22,317 |
| GENERAL TOTAL | — | — | **479.973** |

(1) Number of years of work: see text

2. — *Classification according to sex and age for some categories of farm labour, in holdings with 0,55 hectare and more of agricultural land.*

| Classification | Males Age | Males Number | Females Age | Females Number |
|---|---|---|---|---|
| Members of holders' families | 14 years | 7,135 | 14 years | 5,699 |
| | 15 to 17 years | 8,997 | 15 to 18 years | 11,314 |
| | 17 to 21 years | 13,116 | 18 years and over | 29,299 |
| | 21 years and over | 32,501 | | |
| | *Total* | *61,749* | *Total* | *46 312* |
| Permanent labourers, not members of holders' families, boarded | under 17 years | 25,194 | under 18 years | 18,438 |
| | 17 to 21 years | 34,832 | 18 years and over | 27,461 |
| | 21 years and over | 49,930 | | |
| | *Total* | *109 956* | *Total* | *45 899* |

Table 3 shows the distribution of agricultural land according to great categories of utilisation, and table 5 the area, production and yield per acre of the different crops, while table 4 contains details as to the areas under the various kinds of crops for seed.

## 3. — *Utilization of agricultural land.*

| Classification | Area Acres |
|---|---|
| Cereals cut for grain | 3,389,768 |
| Leguminous crops for grain | 7,591 |
| Tuber crops for food or feed | 171,644 |
| Root crops for fodder | 1,025,238 |
| Grasses and legumes cultivated for fodder | 1,828,601 |
| Crops for industrial purposes | 103,865 |
| Field vegetables | 1) 17,594 |
| Crops grown for seed | 103,586 |
| *Total of crops* | *6,647,827* |
| Bare fallow | 36,345 |
| Half fallow | 42,559 |
| *Total fallow land* | *78,904* |
| TOTAL OF ARABLE LAND | **6,726,731** |
| Permanent meadow and pasture, marsh, etc. | 1 305,319 |
| TOTAL OF AGRICULTURAL LAND | **8,032,050** |

(1) Data for 1938.

## 4. — *Specification of crops grown for seed.*

| Crops | Area Acres |
|---|---|
| Red clover, early | 8,043 |
| Red clover, late | 7,183 |
| White clover, climbing | 6,813 |
| Hybrid clover | 1,139 |
| *Total* | *23,178* |
| Lupulina alfalfa | 1,898 |
| Other leguminous crops | 121 |
| *Total leguminous crops* | *25,197* |
| Mixed leguminous and graminoceous crops | 899 |
| Cocksfoot grass (agglomerated) | 19,250 |
| English rye-grass | 13,010 |
| Italian rye-grass | 6,697 |
| Meadow fescue | 9,798 |
| Brome grass | 927 |
| Rough meadow grass | 3,739 |
| Other meadow grass | 385 |
| Timothy | 3,081 |
| Other graminaceous fodder crops | 1,023 |
| *Total graminaceous fodder crops* | *57,910* |

| Crops | Area Acres |
|---|---|
| Sugar-beet, for factories | 544 |
| Sugar beet, for fodder | 203 |
| Sweet mangels | 2,429 |
| Mangels | 1,688 |
| Kohl-rabi | 2,103 |
| Turnips | 1,577 |
| Carrots | 390 |
| *Total root-crops* | *8,934* |
| Other field crops | 1,030 |
| TOTAL FIELD CROPS | **93,970** |
| Whiteheart cabbage | 539 |
| Cauliflowers | 72 |
| Other cabbage | 227 |
| Carrots | 217 |
| Other garden crops | 1,016 |
| *Total garden crops* | *2,071* |
| Mustard | 7,545 |
| GENERAL TOTAL | **103,586** |

## 5. — *Utilization of arable land.*

| Crops | Area Acres | | Production Centals | Yield per acre Centals |
|---|---|---|---|---|
| Wheat | 329,908 | a | 9,242,470 | 28.0 |
| | | b | 14,328,450 | 43.4 |
| Oats: | | | | |
| white | 891,725 | a | 21,655,882 | 24.3 |
| | | b | 30,732,249 | 34 5 |
| grey | 38,294 | a | 631,186 | 16 5 |
| | | b | 1,017,342 | 26.6 |
| *Total* | *930,019* | a | *22,287,068* | *24 0* |
| | | b | *31,749,591* | *34.1* |
| Barley: | | | | |
| two-rowed | 1,031,191 | a | 27,344,445 | 26,5 |
| | | b | 29,099,057 | 28 2 |
| six-rowed | 9,019 | a | 188,716 | 20 9 |
| | | b | 226,929 | 25 2 |
| *Total* | *1,040,210* | a | *27,533,161* | *26 5* |
| | | b | *29,325,986* | *28.2* |
| Rye | 338,515 | a | 5,325,923 | 15.7 |
| | | b | 9,149,360 | 27 0 |
| Meslin | 751,056 | a | 15,310,406 | 20.4 |
| | | b | 19,517,495 | 26.0 |
| *Total cereals cut for grain* | *3,389,708* | a | *79,699,028* | -- |
| | | b | *104,070,882* | *30.7* |
| Leguminous crops for grain, unmixed | 7,591 | a | 156,485 | -- |
| | | b | 238,409 | --- |
| Potatoes | 171,644 | | 26,979,270 | 157 |
| Turnips | 29,228 | | 12,124,892 | 415 |
| Mangels | 351,574 | | 198,898,522 | 566 |
| Sweet-mangels | 108,404 | | 52,414,858 | 484 |
| *Total* | *459,978* | | *251,313,380* | *546* |
| Sugar-beet utilized for fodder | 50,161 | | 18,964,734 | 378 |
| Carrots | 11,681 | | 3,141,047 | 269 |
| Kohl-rabi | 474,190 | | 260,908,679 | 550 |
| *Root crops for fodder* | *1,025,238* | | *546,452,732* | — |
| Alfalfa | 49,194 | | — | — |
| Clover and grasses for hay | 596,879 | | 1) 26,072,847 | 44 |
| Clover and grasses for pasture | 1,163,145 | | — | - |
| Green fodder | 19,383 | | — | - - |
| *Grasses and legumes cultivated for fodder* | *1,828,601* | | -- | — |
| Sugar-beet utilized for factories | 97,887 | | 36,387,154 | 371 |
| Chicory | 1,510 | | 317,005 | 210 |
| Other crops for industrial purposes | 4,468 | | — | - |
| *Crops for industrial purposes* | *103,865* | | — | - |
| Field vegetables | 2) 17,594 | | - | -- |
| Crops grown for seed | 3) 103,586 | | — | — |
| TOTAL OF CROPS | **6,647,827** | | - | — |

(a) Grain. — (b) Straw. — (1) Hay. — (2) Data for 1938. — (3) See table 4.

Data relating to permanent meadows and pasture and to the number of fruit trees and berry bushes are to be found respectively in tables 6 and 7.

### 6. — *Permanent meadow and pasture, marsh, etc.*

| Classification | Area Acres |
|---|---|
| Permanent meadow, for hay: | |
| Perennial grasses | 83,251 |
| Other meadow | 204,893 |
| *Total* (1) | 288,144 |
| Permanent pasture: | |
| Perennial grasses | 471,504 |
| Other pasture | 312,044 |
| *Total* | 783,548 |
| *Total permanent meadow and pasture* | *1,071,692* |
| Marsh, communal pastures, etc. | 233,627 |
| GENERAL TOTAL | **1,305,319** |

(1) Hay production. 8,932,433 centals

### 7. — *Fruit trees and fruit bushes.*

| Classification | Number of trees or bushes |
|---|---|
| Cherry trees | 1,148,000 |
| Pear trees | 1,479,000 |
| Apple trees: | |
| planted to 1932 | 3,692,000 |
| planted since 1933 | 2,969,000 |
| *Total* | *6,661,000* |
| Plum trees | 1,548,000 |
| Black currants | 2,292,000 |
| Other currants | 3,275,000 |
| Gooseberries | 3,276,000 |

Table 8 gives some figures as to the area of forests and plantations and to the quantity of wood cut in 1938-39.

8. — *Forest and plantations.*

| | |
|---|---|
| Total wooded area (for year 1931) | 859,939 acres |
| Quantity of wood cut in 1938-39: | |
| Timber | 35,738,780 cu. ft. |
| Fuelwood | 39,234,965 » |
| *Total* | *74,973,745* » |

Table 9 refers to the consumption of artificial fertilizers. Finally, tables 10 to 13 refer to the number of livestock, rabbits, poultry and beehives and to the number of mares covered by thoroughbred stallions.

9. — *Total consumption of fertilizers from July 1, 1938 to June 30, 1939.*

| Specification | Quantity Long tons |
|---|---|
| Chile salpeter | 61,524 |
| Nitrate of lime | 116,349 |
| Cyanamide of calcium | 32,415 |
| Ammonium sulphate | 38,729 |
| Nitrophoska | 1,861 |
| Nitrate of soda | 8,907 |
| *Total nitrogenous fertilizers* (15 ½ %) | *246,725* |
| Potassic fertilizers 40 % | 109,825 |
| Superphosphate 18 % | 381,595 |

10 — *Number of holdings with animals.*

| Classification | Number of holdings | Number of animals Absolute data | Number of animals Average per holding |
|---|---|---|---|
| Horses | 187,412 | 584,860 | 3 12 |
| Cattle | 201,111 | 3,324,516 | 10 53 |
| including cows | 200,266 | 1,641,419 | 8.20 |
| Sheep | 19,766 | 145,380 | 7.36 |
| Goats | 3,630 | 5,362 | 1.48 |
| Swine | 194,784 | 3,170,299 | 16.28 |
| Cocks, hens and chickens | 205,915 | 29,609,164 | 143.79 |
| Rabbits | 15,072 | 194,682 | 12.92 |
| Apiculture | 23,921 | (1) 99,838 | (1) 4 17 |

(1) Number of beehives.

## II. — *Livestock on July 15, 1939.*

| Classification | On holdings | Not on holdings | Total |
|---|---|---|---|
| | head | head | head |
| *Horses:* | | | |
| Colts and fillies under 1 year old | 54,214 | 61 | 54,275 |
| Young horses from 1 to 3 years | 92,686 | 290 | 92,976 |
| Stallions 3 years old and over | 4,033 | 269 | 4,302 |
| Mares 3 years old and over | 227,653 | 2,543 | 230,196 |
| Geldings 3 years old and over | 206,274 | 6,004 | 212,278 |
| *Total horses* | *584,860* | *9,167* | *594,027* |
| Including mares impregnated after July 16, 1938 | ... | ... | 93,867 |
| *Cattle:* | | | |
| Calves under 1 year old | 863,768 | 276 | 864,044 |
| Young cattle | 669,244 | 419 | 669,663 |
| Cows (1) | 1,641,419 | 839 | 1,642,258 |
| Bulls | 69,540 | 27 | 69,567 |
| Oxen 1 year old and over | 80,545 | 257 | 80,802 |
| *Total cattle* | *3,324,516* | *1,818* | *3,326,334* |
| *Sheep* | *145,380* | *1,690* | *147,070* |
| *Goats* | *5,362* | *3,281* | *8,643* |
| *Swine:* | | | |
| Boars for breeding | ... | ... | 18,074 |
| Sows: | | | |
| in farrow for the first time | ... | ... | 76,021 |
| other, in farrow | ... | ... | 173,472 |
| in milk | ... | ... | 101,452 |
| not yet covered and not for slaughter | ... | ... | 27,743 |
| for slaughter | ... | ... | 10,854 |
| *Total* | ... | ... | *389,542* |
| Sacking pigs not roeaned | ... | ... | 856,041 |
| Weaned pigs under 35 kg. | ... | ... | 788,740 |
| Pigs of 35 kg and under 60 kg. | ... | ... | 651,095 |
| Fat pigs of 60 kg. and over | ... | ... | 479,362 |
| *Total swine* | *3,170,299* | *12,555* | *3,182,854* |

(1) Cows eliminated after July 16, owing to sterility 180,612; for other reasons 207,371.

## 12. — *Poultry, rabbits and apiculture on July 15, 1939.*

| Classification | On holdings Number | Not on holdings Number | Total Number |
|---|---|---|---|
| **Cocks, hens and chickens:** | | | |
| Chickens under 6 months old | 17,171,215 | 1,990,056 | 19,161,271 |
| Cocks, 6 months old and over | 153,767 | 46,881 | 200,648 |
| Hens, 6 months old and over | 12,284,182 | 1,650,759 | 13,934,941 |
| *Total* | *29,609,164* | *3,687,696* | *33,296,860* |
| Ducks | 820,668 | 74,740 | 895,408 |
| Geese | 364,248 | 28,325 | 392,573 |
| Turkeys | 93,002 | 6,464 | 99,466 |
| *Rabbits* | *194,682* | *143,155* | *337,837* |
| *Apiculture:* | | | |
| Beehives, with movable frames | 97,365 | 57,684 | 155,049 |
| Beehives, others | 2,473 | 951 | 3,424 |
| *Total* | *99,838* | *58,635* | *158,473* |

## 13. — *Mares covered from June 29, 1939 to June 29, 1940, according to breed of stallions.*

| Breed of stallions | Number of mares |
|---|---|
| Pure Jutland breed | 40,100 |
| Belgian breed | 43,900 |
| Great cross breed | 2,400 |
| Frederiksborg breed | 5,000 |
| Other breeds | 7,000 |
| Unspecified breeds | 3,000 |
| *Total* | *101,400* |

## PRODUCTION — LATEST INFORMATION

*Argentina* (Telegram received August 29). According to the first estimate, the areas cultivated to wheat and linseed for the year 1941-42, are practically the same as in 1940-41. Area cultivated to wheat is about 17,545,000 acres, against 17,569,000 last year and 18,277,000 on the average of the five years ending 1939-40; percentages 99 9 and 96.0. Area cultivated to linseed is about 6,746,000 acres, against 6,760,000 acres, against 6,760,000 last year and 7,301,000 on the average of the five years ending 1939-40, percentages 99 8 and 92 4.

## TRADE — LATEST INFORMATION

### ARGENTINA

**Exports for the month of July 1941 and 1940.**

| Production and Unit | July 1941 | July 1940 | Production and Unit | July 1941 | July 1940 |
|---|---|---|---|---|---|
| **Wheat:** | | | **Maize:** | | |
| Thousand centals. | 5,600 | 7,934 | Thousand centals | 71 | 2,325 |
| Thousand bushels of 60 lb | 9,332 | 13,224 | Thousand bushels of 56 lb | 126 | 4,151 |
| **Wheat Flour:** | | | **Linseed:** | | |
| Thousand centals. . . | 51 | 121 | Thousand centals | 1,199 | 192 |
| Thousand barrels of 196 lb. | 26 | 62 | Thousand bushels of 56 lb | 2,142 | 343 |
| **Rye:** | | | **Cotton:** | | |
| Thousand centals . . . | 1 | 7 | Thousand centals . | 15 | 140 |
| Thousand bushels of 56 lb. | 2 | 12 | Thousand bales of 478 lb. | 3 | 29 |
| **Barley:** | | | Wool: Thousand lb. . a) | 10,726 | 5,311 |
| Thousand centals. . . . . | 133 | 171 | Wool: Thousand lb. . b) | 5,194 | 3,569 |
| Thousand bushels of 48 lb. | 277 | 356 | | | |
| **Oats:** | | | Butter: Thousand lb. . . . | 450 | 4,167 |
| Thousand centals. . . . . | 338 | 91 | | | |
| Thousand bushels of 32 lb. | 1,055 | 284 | Cheese: Thousand lb. . . . | 3,397 | 1,138 |

*a)* Unswashed wool. — *b)* Washed wool.

Prof. Ugo Papi, *Segretario generale dell'Istituto, Direttore responsabile.*

PRINTING OFFICE CARLO COLOMBO — ROME, 30, AUGUST 1941.

# MONTHLY CROP REPORT
# AND AGRICULTURAL STATISTICS

*The following explanations refer to crop conditions quoted in the crop notes and in the tables. — Crop condition according to the system of the country: Germany, Bohemia and Moravia (Protectorate); Hungary: 1 = excellent, 2 = good, 3 = average, 4 = poor, 5 = very poor; Finland: 8 = very good, 6 = above the average, 5 = average, France: 100 = excellent, 70 = good, 60 = fairly good, 50 = average, 30 = poor; Romania and Sweden: 5 = excellent, 4 = good, 3 = average, 2 = poor, 1 = very poor; Netherlands: 90 = excellent, 70 = good, 60 = fairly good, 50 = below awerage; Portugal: 100 = excellent, 80 = good, 60 = average, 40 = poor, 20 = very poor, Switzerland: 100 = excellent, 90 = very good, 75 = good, 60 = fairly good, 50 = average, 40 = rather poor, 30 = poor, 10 = very poor; U. S. S. R: 5 = good, 4 = above the average, 3 = average, 2 = below average, 1 = poor; Canada: 100 = crop condition promising a yield equivalent to the average yield of a long series of years; United States: 100 = crop condition which promises a normal yield, Egypt: 100 = crop condition which promises a yield equal to the average yield of the last five years. For other countries the system of the Institute is employed 100 = crop condition which promises a yield equal to the average of the last ten years*

NOTE: *The countries are listed throughout by continents (Europe, followed by the U. S. S. R., America, Asia, Africa and Oceania) in the French alphabetical order. In the tables the Northern Hemisphere precedes the Southern Hemisphere.*

## *VEGETAL PRODUCTION*

### CURRENT INFORMATION FROM VARIOUS COUNTRIES ON WHEAT, RYE, BARLEY AND OATS.

*Belgium*: Owing to persistent rains in August harvesting was seriously interfered with. In various regions, rather serious damage was done. At the end of the month, weather improved somewhat, and a good part of the harvest could be barned. Threshing had begun.

The area under spelt in 1941 is estimated at 10,320 acres against 17,840 acres in 1940 and an average of 26,300 acres in 1935 to 1939, percentages, 108.3 and 73.4. The corrisponding figures for meslin are as follows: 6,270 acres, 4,930 acres and 6,500 acres, percentages, 127.1 and 96.5.

*Bohemia Moravia*. The Department of Agriculture has drawn up a programme of cereal sowings for the agricultural year 1941-42. According to this programme, the total area under wheat will amount to 988,000 acres, including 805,000 acres under winter wheat, and the area under winter rye, to 1,235,000 acres.

*Denmark:* Weather conditions in August were anything but favourable for cereals. Consequently, on September 1st, the condition of all cereal crops was somewhat worse than on August 1st. With the exception of wheat, it was also worse than on September 1st 1940.

The following tables contain figures showing the condition of cereal crops, according to the system of the Institute, on September 1st 1941, as compared with August 1st 1941 and with September 1st 1940.

| Crops | Sept 1, 1941 | August 1, 1941 | Sept 1, 1940 |
|---|---|---|---|
| Wheat | 72 | 75 | 64 |
| Rye | 78 | 83 | 88 |
| Barley | 78 | 82 | 88 |
| Oats | 74 | 79 | 84 |
| Meslin | 74 | 79 | 83 |

On September 1st 1941, the cereal harvest was not yet finished

*Spain* The situation in the main cereal growing provinces may be summed up as follows *Wheat:* an average crop in Valladolid and Segovia; a good one in Seville, Ciudad Real, Saragossa and Albacete On the average, it is expected that the weight of the bushel will be some 60 to 61 lb *Rye* the output is estimated to be a good one in Salamanca and Zamora, but only an average one in the very important province of León. *Barley:* the output is very good in Badajoz and Caceres, but rather poor in Toledo, *Oats:* a very good crop in Caceres, and a good one in Soria and Valladolid.

During the month of August, weather favoured on the whole the harvesting of cereals, yet harvest work appears to have been belated.

*Finland:* Weather favoured on the whole the crops during the month of August But little damage due to diseases is reported The drought did some damage in the South-West and West of the country A somewhat larger cereals crop than in 1940 is expected.

*France:* It is confirmed that the wheat harvest has been a good one in France, so as to cover the needs of the country until next year.

*Hungary:* During the first half of the three weeks ending August 23rd, there fell rather frequent rains, which hindered more or less the harvesting and threshing of cereals. The second half of the said period was, instead, favourable to this work.

On August 23rd, the condition of the various cereals was as follows.

W h e a t. — With the exception of the Northern and North-Eastern regions of the country, the wheat harvest was ended everywhere, while threshing was proceeding. The yields of the threshing were in several places less than was expected. The grains are on the whole of a good quality. The straw harvest was somewhat above the average. For the whole country, an average yield per acre was expected.

R y e. — The harvesting and threshing of rye were ended almost everywhere. Again in the case of this crop, the results of threshing have deceived expectations. For the whole country, a rye crop below the average is expected

B a r l e y. — The threshing of winter barley was ended everywhere at the said date. The yield was an average one, both as to quality and quantity. The threshing of spring barley was still proceeding. The grains are fine and of a good quality, but, owing to excessive rains, they are, in some regions, discoloured. The straw output is an average one. For the whole country, an average output of spring barley was expected.

O a t s. — The harvest of early sown oats was finished, and the threshing of same proceeding. The harvest of late varieties was going on in the flat country,

## Area and Production of Cereals

| Countries | Area 1941 | Area 1940 | Area Aver 1935-1939 | % 1941 1940 = 100 | % 1941 Aver = 100 | Production 1941 | Production 1940 | Production Aver 1935-1939 | Production 1941 | Production 1940 | Production Aver 1935-1939 | % 1941 1940 = 100 | % 1941 Aver = 100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 000 acres | | | | | 000 centals | | | 000 bushels | | | | |
| **WHEAT** | | | | | | | | | | | | | |
| Belgium | 439 | (w) 354 | 394 | — | 111 4 | | | 9 691 | | | 16,151 | | |
| Spain | 9 445 | 8 735 | (1)8 639 | 108 1 | 109 3 | 65 377 | 47 648 | 63 270 | 108 959 | 79 412 | (1)105 448 | 137 2 | 103 3 |
| Ireland | 491 | 305 | 225 | 160 9 | 218 4 | | 7 011 | 4 613 | | 11 685 | 7 689 | | |
| Italy | | 12 566 | 12 639 | | | 157 631 | 156 754 | 167 713 | 262 713 | 261 251 | 279 517 | 100 6 | 94 0 |
| Rumania | (2)5 807 | (2)5 014 | 9 054 | 115 8 | | (2)54 124 | (2)30 225 | 84 491 | (2)90 204 | (2)50 375 | 140 816 | 179 1 | — |
| Slovakia | 550 | 533 | (3) 539 | 103 1 | 102 1 | 6 955 | 6 740 | (3) 8 572 | 11 591 | 11 233 | (3)14 287 | 103 2 | 81 1 |
| Sweden | 707 | 763 | 741 | 92 6 | 95 4 | 7 496 | 9 522 | 15 811 | 12 493 | 15 869 | 26 351 | 78 7 | 47 4 |
| Canada | 22 372 | 28 726 | 25 596 | 77 9 | 87 4 | 183 875 | 330 834 | 187 440 | 306 459 | 551 390 | 312 399 | 55 6 | 98 1 |
| United States (w) | 40 316 | 36 147 | 41 186 | 111 5 | 97 9 | 436 929 | 353 491 | 351 467 | 728 215 | 589 151 | 585 778 | 123 6 | 124 3 |
| United States (s) | 16 467 | 17 356 | 16 387 | 94 9 | 100 5 | 137 609 | 136 528 | 105 964 | 229 348 | 227 547 | 176 606 | 100 8 | 129 9 |
| Mexico | 1 347 | 1 450 | 1 251 | 92 9 | 107 6 | 8 257 | 8 002 | 7 391 | 13 826 | 13 337 | 12 318 | 103 7 | 112 3 |
| India | 34 499 | 33 673 | 34 262 | 102 5 | 100 7 | 223 306 | 238 358 | 220 922 | 372 176 | 397 264 | 368 204 | 93 7 | 101 1 |
| Japan | 1 983 | 2 024 | 1 738 | 96 1 | 114 1 | 35 705 | 39 682 | 30 078 | 59 507 | 66 135 | 50 130 | 90 0 | 118 7 |
| Syria and Lebanon | 1 600 | | 1 363 | | 117 4 | 16 560 | 14 760 | 11 692 | 27 600 | 24 600 | 19 486 | 112 2 | 141 6 |
| Algeria | | | 4 176 | | | 19 200 | 16 560 | 20 890 | 32 000 | 27 600 | 34 816 | 115 9 | 91 9 |
| Egypt | 1 561 | 1 563 | 1 464 | 99 9 | 106 7 | 24 918 | 29 997 | 27 510 | 41 529 | 49 994 | 45 848 | 83 1 | 90 6 |
| Tunisia | 1 3[illegible] | 1 359 | 1 884 | 97 3 | 70 2 | 8 819 | 6 393 | 9 019 | 14 697 | 10 655 | 15 031 | 137 9 | 97 8 |
| Argentina | (4)17 767 | (4)17 569 | (4)18 577 | 101 1 | 95 6 | | 162 706 | 131 710 | | 271 171 | 219,512 | | |
| Uruguay | 1 043 | 924 | 1 228 | 112 8 | 84 9 | | 4 [illegible]35 | 7 954 | | 7 058 | 13 256 | | • |
| **RYE** | | | | | | | | | | | | | |
| Belgium | 310 | 280 | 369 | 110 7 | 84 1 | | | 7 790 | | | 13 910 | | |
| Spain | 1 473 | 1 361 | (1)1 302 | 108 2 | 113 1 | 8 754 | 7 740 | (1) 9 041 | 15 632 | 13 821 | (1)16 144 | 113 1 | 96 8 |
| Slovakia | 376 | 368 | (3) 380 | 102 2 | 98 9 | 4 155 | 4 403 | (3) 5 259 | 7 420 | 7 862 | (3) 9 391 | 94 4 | 79 0 |
| Sweden | 509 | 422 | 495 | 120 5 | 102 8 | 6 195 | 6 275 | 8 304 | 11 063 | 11 205 | 14 828 | 98 7 | 74 6 |
| Canada | 1 077 | 1 035 | 816 | 104 1 | 131 9 | 7 785 | 7 837 | 5 147 | 13 902 | 13 994 | 9 191 | 99 3 | 151 3 |
| United States | 3 436 | 3 192 | 3 773 | 107 6 | 92 5 | 26 019 | 22 737 | 25 576 | 46 462 | 40 601 | 45 672 | 114 4 | 101 7 |
| Argentina | (4)2 340 | (4)2 751 | (4)2 480 | 85 1 | 94 4 | | 4 678 | 5 586 | | 8 354 | 9 974 | | |
| **BARLEY** | | | | | | | | | | | | | |
| Belgium | 74 | 57 | 76 | 130 4 | 98 0 | | | 1 757 | | | 3 661 | | |
| Spain | 3 886 | 3 859 | (1)3 382 | 100 7 | 114 9 | 37 146 | 30 769 | 31 262 | 77 390 | 64 103 | 65 130 | 120 7 | 118 8 |
| Ireland | 169 | 132 | 118 | 128 0 | 142 9 | | 3 111 | 2 598 | | 6 487 | 5 413 | | |
| Slovakia | 479 | 495 | (3) 490 | 96 8 | 97 9 | 5 817 | 6 699 | (3) 6 914 | 12 118 | 13 956 | (3)14 405 | 86 8 | 84 1 |
| Canada | 5 449 | 4 341 | 4 291 | 125 5 | 127 0 | 58 261 | 50 043 | 42 663 | 121 378 | 104 256 | 88 882 | 116 4 | 136 6 |
| United States | 13 977 | 13 394 | 10 774 | 104 4 | 129 7 | 167 806 | 148 433 | 113 409 | 349 596 | 309 235 | 236 270 | 113 1 | 148 0 |
| Japan | | 1 848 | 1 892 | | | 38 675 | 37 198 | 35 112 | 80 574 | 77 498 | 73 152 | 104 0 | 110 1 |
| Algeria | | | 3 058 | | | 15 360 | 7 920 | 15 415 | 32 000 | 16 500 | 32 114 | 193 9 | 99 6 |
| Egypt | 255 | 268 | 278 | 95 1 | 95 1 | 4 699 | 5 315 | 7 339 | 9 789 | 11 073 | 15,290 | 88 4 | 64 0 |
| Tunisia | | | 1 174 | | | 4 400 | 2 000 | 4 564 | 9 186 | 4 134 | 9 508 | 222 2 | 96 6 |
| Argentina | (4)1 735 | (4)2 139 | (4)1 901 | 81 1 | 91 3 | | 17 395 | 11 329 | | 36 239 | 23,602 | | |
| Uruguay | 67 | 54 | (5) 36 | 122 7 | — | | 216 | (5) 259 | | 450 | (5) 539 | | |
| **OATS** | | | | | | | | | | | | | |
| Belgium | 413 | | 548 | | 75 4 | | | 14 074 | | | 43 982 | | |
| Spain | 1 646 | 1 597 | (1)1 423 | 103 1 | 115 7 | 12 469 | 10 459 | (1)10 549 | 38 964 | 32 685 | (1)32 966 | 119 2 | 118 2 |
| Ireland | 776 | 681 | 571 | 114 0 | 136 0 | | 16 222 | 12 565 | | 50 694 | 39 265 | | |
| Canada | 13 841 | 12 298 | 13 246 | 112 6 | 104 5 | 121 705 | 129 379 | 114 944 | 380 327 | 404 309 | 359 201 | 94 1 | 105 9 |
| United States | 37 236 | 34 847 | 35 417 | 106 9 | 105 1 | 361 522 | 395 401 | 329 369 | 1,129 757 | 1 235 628 | 1 029 279 | 91 4 | 109 8 |
| Algeria | | . | 470 | . | | 2 560 | | 3 387 | 8 000 | | 10 585 | | 75 6 |
| Argentina | (4)3 558 | (4)3,899 | (4)3 547 | 91 3 | 100 3 | | 11 894 | 16 254 | | 37,168 | 50 795 | | |
| Uruguay | 237 | 225 | 213 | 105,5 | 111 2 | | 421 | 992 | | 1 316 | 3 100 | | |

(w) Winter crop — (s) Spring crop — (1) Year 1939 — (2) Not including territories ceeded in 1940
(3) Average of two years — (4) Area sown — (5) Not including barley for brewery

while the cereal was still maturing in the higher regions. In many places, late varieties of oats had been invaded by weeds. For the whole country, an average output of oats is expected.

During the three weeks from August 23rd to September 13th, weather was very unsettled, the rainfall anything but uniform, and in some places gales were recorded. On September 13th, the threshing of cereals was over everywhere, except in big properties and in mountainous regions.

About the middle of September, the tilling of the soil for sowing winter cereals was proceeding regularly. At that time, the sowing of winter rye and barley had begun everywhere, and was even already finished in some places.

*Norway:* On September 1st, the condition of the cereals was, according to the system of the Institute, as follows: winter wheat, 86; spring wheat, 94, winter rye, 98; spring rye, 93, barley, 96, oats, 90, mixed corn, 96

*Romania:* During the first half of September, the tilling of land for sowing winter cereals was somewhat interfered with by drought, especially in the South of Oltenia and of Muntenia. The extent of the area already tilled allowed to hope that the programme of autumn sowings would be completely carried out.

Government officials do their best to propagate among the agriculturists the necessity of improving the technics of cultivation (two tillings before autumn sowings, selected seeds, etc.).

*Slovakia:* The rather long last winter has hindered this year the normal vegetation of cereals, both maturation and harvest being belated.

The wheat output is expected to be slightly better than last year, owing chiefly to the increase in the cultivated area. Instead, the rye crop is smaller than last year, notwithstanding a slight increase in the area under rye Spring barley, the area under which has somewhat decreased, has given a very poor yield This year's output of oats is not yet known.

The National Bank has opened a first credit of 100 krusy for the purchase of cereals.

The Central Bureau of Statistics of Slovakia has recently published final data relating to the harvested aera and to the output of cereals during the years 1938 to 1940 They are shown in the following table

*Area* (thousand acres).

| | 1940 | 1939 | 1938 | % 1940 1939 = 100 | % 1940 1938 = 100 |
|---|---|---|---|---|---|
| Wheat | 533 | 569 | 508 | 93.7 | 105.0 |
| Rye | 368 | 381 | 378 | 96.4 | 97.1 |
| Barley | 495 | 477 | 502 | 103.9 | 98.6 |
| Oats | 365 | 325 | 340 | 112.2 | 107.2 |

*Production.*

| | | 1940 | 1939 | 1938 | % 1940 1939 = 100 | % 1940 1938 = 100 |
|---|---|---|---|---|---|---|
| Wheat | 1.000 centals | 6,740 | 9,215 | 7,930 | 73.1 | 85.0 |
| | 1.000 bushels | 11,233 | 15,359 | 13,216 | | |
| Rye | 1.000 centals | 4,403 | 5,318 | 5,199 | 82.8 | 84.7 |
| | 1.000 bushels | 7,862 | 9,497 | 9,285 | | |
| Barley | 1.000 centals | 6,699 | 6,541 | 7,287 | 102.4 | 91.9 |
| | 1.000 bushels | 13,956 | 13,628 | 15,182 | | |
| Oats | 1.000 centals | 4,596 | 3,755 | 3,564 | 122.4 | 129.0 |
| | 1.000 bushels | 14,363 | 11,735 | 11,138 | | |

*Switzerland:* The month of August was this year a distinctly wet one. There were counted eighteen days of rain, and there were never more than two days at a time without rain. Again the temperatures registered at night were rather low everywhere. The bad weather which prevailed during the month seriously hindered harvesting, and thus in many places grain was lost, or its quality was poor. As a matter of fact, autumn barley and rye could still be barned in a good condition in most places, but the wheat and spelt harvest coincided with the rainy period, and consequently a very serious loss in grain and ears was suffered. It proved necessary to barn large amounts of damp cereals, and this is likely to have effects on the quality of the meal.

*Argentina.* The condition of the wheat crops was good in all cereal growing regions of the country. The second official evalution of the area under wheat in 1941-42 shows an increase of 222,400 acres, as compared with the first one, made in August. Thus the area under cereals exceeds by 1,1 per cent the area registered in 1940-41, and 4,4 per cent below the average of the foregoing five years.

*Chile.* The tilling of the soil for the sowing of cereals was belated owing to excessive rains in autumn. The Government has taken various measures in order to extend the culture of cereals in the country.

*United States.* During the week ending August 27, moderate temperatures and wide spread showers prevailed, but considerable areas in the interior valleys were still dry. Showers interrupted harvesting and threshing of small grains but preparation for autumn seedings progressed well. During the week ending September 3, considerable rains were reported in the North and in many southern areas, but the central valleys continued to be dry. Autumn seedings started in Western Kansas under very favourable conditions. During the following week good rains fell in the interior States, improving late crops and autumn seedings conditions. Harvesting of small grains in North Dakota and Minnesota was delayed by unfavourable weather.

The week ended September 17 was favourable in most of the interior States but in the Western area some damage was caused by frost and in some other sections by heavy rains. Autumn ploughing and seeding were active in the wheat belt. Weather was favourable in the West, while in the East it was seriously dry during the week ended September 24. In the North-West sections much small grains late crops were reported spoiled in shock by rains. Soil preparation and seedings of winter cereals advanced under favourable conditions in the western half of the wheat belt.

*Uruguay.* According to the latest official reports, the very rainy autumn weather has hindered the usual agricultural work of the season. Instead, the dry and cold winter favoured the sowing of cereals. The condition of the wheat, oats and barley crops is thought to be a good one, notwithstanding some damage due to excessive rains.

*Turkey.* According to information given in the press, the output of cereals was this year about the same as in 1940, when it was estimated to have amounted to 90 millions of centals (151 millions of bushels), i. e. to have been by 11 millions of centals or 18 millions of bushels above the average of 1935-1939.

*Tunisia:* According to the latest unofficial information received, the output was this year rather better than had been expected at the beginning of summer. The improvement was due to the rather cool weather that prevailed in May and June and allowed of a slow and gradual maturation of the wheat. The evaluation of the harvest, although again unofficial in 1941 as it had been in 1940, has been inserted in the table on page 435.

## CURRENT INFORMATION ON MAIZE.

*Spain:* The condition of the maize crop is good. The area cultivated in 1941 is less than in 1940 (1,117,500 acres), but about the average. The output per acre is expected to be a big one in the main producing regions.

The production of maize in 1941 is estimated at 15,383,000 centals (27,470,000 bushels) against 16,353,000 (29,202,000) in 1940 and 18,590,000 (33,197,000) in 1939 percentages. 91.4 and 82.7.

*Hungary.* About August 23rd, the condition of maize was as follows. Favoured by good weather, this crop had progressed well. Ears and grains were, generally speaking, well developped. A long and warm autumn would be necessary for the development of late varieties At the said date, an average yield of maize was expected.

About September 13th, sunny and warm weather was needed for the maturation of maize. In some places, gales have done damage to the crops, especially in the Northern and Eastern departments

*Romania:* At the middle of September, maize was somewhat belated in the hilly regions, but almost mature in the plain. A good harvest was foreseen, especially for the crops that had been weeded twice

*Slovakia.* According to the recent estimate area cultivated to maize in 1940 was 73,000 acres, against 75,100 in 1939 and 77,500 in 1938, percentages 97.2 and 94.2. The corresponding production was estimated at about 1,180,700 centals (2,108,400 bushels) against 1,643,500 (2,934,900) and 1,550,600 (2,769,000), percentages: 71.8 and 76.1.

*United States* By the end of August late maize crop continued to improve and during September it was developing and maturing rapidly with warm weather, practically safe from frost damage

According to the September Crop Report, the production of maize in 1941 is estimated at 1,413,420,000 centals (2,523,964,000 bushels) against 1,371,552,000 (2,449,200,000) in 1940 and an average of 1,302,162,000 (2,325,290,000) in 1935 to 1939, percentages, 103.1 and 108.5.

## CURRENT INFORMATION ON RICE.

*Spain:* The vegetation of rice is good in the provinces of Castellón and Alicante and in Catalogne. Transplanting was proceeded with properly, and a good crop is expected.

According to the latest estimate area cultivated to rice is 133,000 acres, against 132,000 in 1940 and 106,000 in 1939 percentages: 100,8 and 125,3. The corresponding production is estimated at about 6,150,000 centals (13,666,200 bushels) against 5,925,000 (13,167,500) and 3,926,700 (8,725,800); percentages. 103,8 and 156.6.

*Italy:* According to data available at the middle of September, the area under rice in 1941 appears to be somewhat larger than in 1940. At present, the crops are likely to be big and of a good quality.

*Brazil:* According to information given in the press, the rice crop has suffered very serious damage during the present campaign owing to the excessive rains which fell in the autumn in the State of Rio Grande do Sul, the main rice growing region of the country. In the Southern rice growing districts, the damage was less serious, but the quality of the product was rather poor.

*United States:* According to the September Crop Report, the production of rice in 1941 is estimated at 27,257,400 centals (60,572,000 bushels) against 23,739,300 (52,754,000) in 1940 and an average of 22,398,500 (49,774,400) in 1935 to 1939; percentages, 114.8 and 121.7.

## CURRENT INFORMATION ON POTATOES.

*Belgium:* In some regions, the phytophtora disease had made its appearance. In the case of half-early varieties, it was already too late for sprinkling. Agriculturists were strongly advised to mow down the diseased areas, and to tear out the plants as soon as possible.

The area under potatoes in 1940 is estimated at 190,100 acres against 364,600 acres in 1939 and an average of 389,700 acres in 1934 to 1938, percentages, 52.1 and 48.8.

*Denmark:* Owing to rains in August, potatoes had a fairly good appearance on September 1st last. The condition of the crop was particularly good in Funen and in Lolland-Falster. For the whole country, the condition of the potato crop was quoted 87, just as on August 1st, as compared with 95 on September 1st 1940.

*Spain:* The area under potatoes appears to be a very large one this year. Generally speaking, a good output is expected, notwithstanding a certain lack of manure and attacks by insects in some provinces.

*Finland:* Weather conditions were particularly favourable to potato crops during the month of August. On August 1st, the condition of the potato crops was an average one (5,0 according to the local classification).

*Hungary:* About August 23rd, the condition of potatoes was as follows. Early varieties were being harvested and sold on the market. The tubercles were copious and healthy, but in many places rather small. Late varieties had a good aspect, but their leaves and stalks were still quite green in many places. Good rains followed by warm and sunny weather were needed for their maturing. On August 23rd, a crop somewhat above the average was expected for the country as a whole.

About September 13th, warm and sunny weather was needed for the maturation of potatoes. In some places, strong gales had done some damage to the crops.

*Norway:* On September 1st, the condition of potato crops was, according to the system of the Institute, 100.

*Slovakia:* According to the recent estimate area cultivated to potatoes in 1940 was 438,000 acres, against 410,300 in 1939 and 425,300 in 1938, percentages 106.8 and 103.0. The corresponding production is estimated at about 30,765,400 centals (61,274,400 bushels) against 42,593,100 (70,987,000) and 43,529,800 (72,548,200), percentages: 86.3 and 84.5.

*Sweden:* On September 1st, the condition of potatoes was quoted 105 according to the system of the Institute, as compared with 114 at the same time last year. According to the local system, these quotations were respectively 3,1 and 3,3.

*Switzerland.* The potato crops were somewhat favoured by rain. Indeed, rain came too late for the early varieties; these had already seriously suffered from drought, so that the output remained substantially below the average. Generally speaking, late varieties are likely to give a better yield than it could have been expected at times. However, persistent rains favoured the spread of *ptytophora*. In particular, the aspect of fields sown with seeds suffering from degeneracy is anything but pleasing. On the whole, only an average yield may be expected.

*United States* According to the September Crop Report the production of potatoes in 1941 is estimated at 224 311 800 centals (373 853 000 bushels) against 238 633 200 (397 722 000) in 1940 and an average of 222 109 700 (370 182 800) in 1935 to 1939, percentages 94 0 and 101 0

## CURRENT INFORMATION ON SUGAR.

*Belgium* The sugar beet plants are in a good condition The sugar contents are still low

*Belgium* The area under sugar beet in 1940 is estimated at 131 900 acres against 134 200 acres in 1939 and an average of 124 300 acres in 1934 to 1938 percentages 98 3 and 106 1

*Denmark* Owing to rains in August the condition of sugar beet has much improved Particularly good yields are expected in Funen For the whole country, the condition of the crops was on September 1st 95 as compared with 90 on August 1st last and with 98 on September 1st 1940

Results of the weekly analyses of sugarbeets

| WEEK | Average weight of root | | | Average weight of leaves | | | Sugar content | | | Weight of sugar per root | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1941 | 1940 | 1935 1939 | 1941 | 1940 | 1935 1939 | 1941 | 1940 | 1935 1939 | 1941 | 1940 | 1935 1939 |
| | oz | oz | oz | oz | oz | oz | % | % | % | oz | oz | oz |
| 3rd week of August | 11 4 | 12 6 | 11 5 | 18 8 | 18 2 | 15 7 | 12 3 | 14 3 | 14 4 | 1 4 | 1 8 | 1 6 |
| 4th week of August | 13 3 | 14 0 | 1) 13 7 | 19 8 | 17 6 | 1) 16 3 | 12 9 | 15 4 | 1) 14 9 | 1 7 | 2 2 | 2 0 |
| 5th week of August | 15 2 | — | 1) 13 8 | 20 5 | | 2) 15 5 | 13 7 | — | 2) 14 9 | 2 1 | — | 2 1 |
| 1st week of September | 16 4 | 15 6 | 15 5 | 20 3 | 17 4 | 15 5 | 15 1 | 15 7 | 15 6 | 2 5 | 2 4 | 2 4 |

(1) Average of four years — 2) Average of three years

*Spain* The condition of the sugar beet crops is on the whole good The cultivated area is estimated to be about the same as in 1935 when it amounted to 175 400 acres The crops are thought to be satisfactory

*Hungary* Sugar beet developped well in July and August About August 23rd this crop needed rain in several regions Leaves were duly green and rich and roots healthy but only of an average size At the said date, a crop somewhat above the average was expected

On September 13th warm and sunny weather was required for maturation

*Netherlands* Results of the weekly analyses of sugarbeets

| WEEK | Average weight of root | | | Average weight of leaves | | | Sugar content | | | Weight of sugar per root | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1941 | 1940 | 1935 1939 | 1941 | 1940 | 1935 1939 | 1941 | 1940 | 1935 1939 | 1941 | 1940 | 1935-1939 |
| | oz | oz | oz | oz | oz | oz | % | % | % | oz | oz | oz |
| 2nd week of August | 14 7 | — | 1) 14 3 | — | — | — | 12 3 | — | 1) 13 8 | 1 8 | — | 1) 2 0 |
| 4st week of August | 18 5 | — | 1) 18 6 | — | — | — | 13 7 | — | 1) 14 4 | 2 5 | — | 1) 2 7 |

(1) Average of four years

*Romania* According to an official estimation, the output of sugar beet amounted this year to 21,8 million centals (1,1 million short tons), as compared with 11.5 (0,6) in 1940. These figures refer to the present territory as it is after all the territorial cessions of 1940. The average output of sugar-beet during the five years 1935-1939 was, on the territory of Greater Roumania, 13 9 (0 7)

*Slovakia* According to the recent report area cultivated to sugar beet in 1940 was 68,400 acres, against 51,900 in 1939 and 51,300 in 1938; percentages 131 8 and

## *Production of Cane-Sugar.*

| COUNTRIES | 1940-41 (1) | 1939-40 | Average of 1934-35 to 1938-39 | 1940-41 (1) | 1939-40 | Average of 1934-35 to 1938-39 | % 1940-41: 1939-40 = 100 | % 1940-41: Average = 100 |
|---|---|---|---|---|---|---|---|---|
| | 000 centals | | | short tons | | | | |
| **AMERICA.** | | | | | | | | |
| Antigua | 540 | 309 | 520 | 27,000 | 15,000 | 25,984 | 175 | 104 |
| Argentina | 11,845 | 11,469 | 8,804 | 592,218 | 573,455 | 440,171 | 103 | 135 |
| Barbados | 1,698 | 1,587 | 2,718 | 85,000 | 79,000 | 135,905 | 107 | 62 |
| Brazil | 28,506 | 25,923 | 23,231 | 1,425,000 | 1,296,130 | 1,161,530 | 110 | 123 |
| Cuba | (2) 54,678 | 63,163 | 60,266 | (2) 2,733,880 | 3,158,000 | 3,013,269 | 87 | 91 |
| United States (La & Fl) | 7,077 | 10,392 | 8,528 | 353,854 | 519,597 | 426,400 | 68 | 83 |
| British Guiana | 4,255 | 3,748 | 4,233 | 213,000 | 190,000 | 211,669 | 114 | 101 |
| Jamaica | 3,527 | 2,227 | 2,289 | 176,000 | 111,000 | 114,455 | 158 | 154 |
| Martinique | 1,213 | 1,323 | 1,167 | 61,000 | 70,000 | 58,359 | 92 | 104 |
| Mexico | 6,900 | 6,834 | 6,763 | 345,000 | 340,000 | 338,128 | 101 | 102 |
| Peru | 9,590 | 9,921 | 8,426 | 480 000 | 500,000 | 421,291 | 97 | 114 |
| Puerto Rico | 18,151 | 20,375 | 17,748 | 907,500 | 1,018,700 | 887,390 | 89 | 102 |
| Dominican Republic | (2) 7 840 | 10,188 | 9,339 | (2) 392,000 | 509,400 | 466,926 | 77 | 84 |
| St Kitts | 851 | 692 | 700 | 42,500 | 34,600 | 34,977 | 123 | 122 |
| Trinidad | 2,734 | 2,065 | 3,086 | 137,000 | 103,250 | 154,308 | 132 | 89 |
| Venezuela | 611 | 542 | 514 | 30,500 | 27,100 | 25,706 | 113 | 119 |
| *Total America* | *160,016* | *170,758* | *158,332* | *8,001,452* | *8,545,232* | *7,916,468* | *94* | *101* |
| **ASIA** | | | | | | | | |
| Taiwan | 20,803 | 26,630 | 23,776 | 1,040,100 | 1,331,500 | 1,188,782 | 78 | 87 |
| India | 76,655 | 72,598 | 72,761 | 3,833,000 | 3 630,000 | 3,638,000 | 106 | 105 |
| Japan | 2,399 | 3,386 | 2,751 | 119,900 | 169,300 | 137,560 | 71 | 87 |
| Java | 38,361 | 34,569 | 23,832 | 1 920,000 | 1,728,000 | 1,191,582 | 111 | 161 |
| Philippines | (2) 21,839 | (2) 21,065 | 21,141 | (2) 1,091,900 | (2) 1,053,200 | 1,057,042 | 104 | 103 |
| *Total Asia* | *160,057* | *158,248* | *144,261* | *8,004,900* | *7,912,000* | *7,212,966* | *101* | *111* |
| **AFRICA.** | | | | | | | | |
| Egypt | 3,924 | 3,524 | 3,213 | 196 000 | 176,198 | 160,668 | 111 | 122 |
| Mauritius | 6,957 | 5,059 | 6,150 | 347,850 | 252,930 | 307,505 | 138 | 113 |
| Reunion | 1,874 | 1,622 | 1,782 | 94,000 | 81,100 | 89,098 | 116 | 105 |
| Union of South Africa | 11,463 | 11,839 | 10,010 | 570,000 | 592,000 | 500,515 | 97 | 115 |
| *Total Africa* | *24,218* | *22,044* | *21,155* | *1,207,850* | *1,102,228* | *1,057,786* | *110* | *114* |
| **OCEANIA.** | | | | | | | | |
| Australia | 18,010 | 20,787 | 16,607 | 900,500 | 1,039,400 | 830,341 | 87 | 108 |
| Hawaii | 19,379 | 19,028 | 19,112 | 969,000 | 951,400 | 955,596 | 102 | 101 |
| Fiji Islands | 2,315 | 2,205 | 2,973 | 116,000 | 100,000 | 148,630 | 105 | 78 |
| *Total Oceania* | *39,704* | *42,020* | *38,692* | *1,985,500* | *2,090,800* | *1,934,567* | *94* | *103* |
| **TOTALS** | **383,995** | **393,070** | **362,440** | **19,199,702** | **19,650,260** | **18,121,787** | **98** | **106** |

(1) Approximate data. — (2) Willet & Gray estimate.

133.2. The corresponding production was estimated at about 12,592,300 centals (629,600 short tons) against 11,708,300 (585,400) and 10,798,400 (539,900), percentages 107.6 and 116.6

*Sweden* The production of beet sugar in 1940-41 according to a communication of the Central Bureau of Statistics is estimated at 6,261,000 centals (313,000 short tons) against 6,856,000 (342 800) in 1939-40 and an average of 6,632,000 (331,600) in 1934-35 to 1938-39, percentages, 91.3 and 94.4.

On September 1st, the condition of the sugar-bee crop was quoted 103 according to the system of the Institute, as compared with 100 at the same time last year. According to the local system, these quotations were respectively 3.1 and 3.0.

*United States:* According to the September Crop Report, the production of sugar-beet in 1941 is estimated at 197,360,000 centals (9,868,000 short tons) against 243,840,000 (12,192,000) in 1940 and an average of 192,464,000 (9,623,000) in 1935 to 1939, percentages, 80.9 and 102.5.

## CURRENT INFORMATION ON VINES.

*Bulgaria* At the middle of August, the work of the season had been already done, and so was especially everywhere the fourth, as a rule the fifth, and in some cases even the seventh, sulphate sprinkling. Although sulphate was sometimes lacking not so much damage was done by mildew as was apprehended before. This year's vintage prospects are once more said to be good the vintage being likely to prove both better and larger than last year.

*Spain:* Owing to unfavourable weather in August and to mildew, the vintage is likely to be rather poor this year The grapes are estimated to amount to 54,895,300 centals, and the must to 348,353,200 (418,340,900) gallons In the ten years 1926-1935, the highest output of must was reached in 1927 with 623,080,600 (748 263,800) gallons, while the lowest one, that of 1926, amounted to 346,549,400 (416 174 700) gallons.

*Hungary* During the three weeks ending August 23rd 1941, weather favoured on the whole the growth of vines About September 13th, sunshine and warm weather were needed for the maturation of grapes.

*Romania.* At the beginning of the month of September, the condition of the vineyards was satisfactory.

*Slovakia:* After the poor yield of the 1940 vintage, the output of grapes and wine is expected to be much more satisfactory this year.

According to the recent report area cultivated to vineyards was in 1940 12,100 acres, against 13,600 in 1939, percentage 88.7. The corresponding grapes production was estimated at about 280,900 centals against 777,600; percentage: 36.1

The production of wine in 1940 was estimated at 1,475,000 Imperial gallons (1,771,000 American gallons) against 4,531,000 (5,441,000) in 1939, percentage, 32.5.

*Switzerland:* Notwithstanding rainy weather, vineyards progressed well. Save in a few exceptional cases, vine-growing regions have not suffered from hail. The condition of the vineyards is on the whole satisfactory, and the development of grapes is already well ahead. If autumn weather proves fairly favourable, a vintage of a good quality may be looked for.

## CURRENT INFORMATION ON OLIVES.

*Spain.* A good olive crop is expected Some damage was done by bad weather and hail in several regions

The total area covered by olive-trees was estimated to amount this year to 5,226,400 acres, as compared with 5,157,200 acres last year. The oil producing areas were 1,784,000 and 1,730,000 acres respectively.

## CURRENT INFORMATION ON FLAX.

*Belgium* The area under flax crops in 1940 is estimated at 112,500 acres against 110,460 acres in 1939 and an average of 68,270 acres in 1934 to 1938, percentages, 101 0 and 164.8).

*Bulgaria* At the end of August flax had been harvested. The fibre seems well developped.

*Croatia* This year's area under flax is estimated to amount to 22,200 acres, i. e some 60 per cent of the area under flax in former Yugoslavia. The output of flax is likely to be satisfactory this year, both as to quantity and quality Flax prices are very high this year having nearly doubled as compared with 1940

*Hungary:* About August 23rd, flax cultivated chiefly for spinning was being gathered in Stalks were rather high, and the yield in fibre good The output of flax cultivated chiefly for seed was below the average.

*Romania* The output of spring flax and hemp was this year rather below the average A further extension of textile crops is foreseen for next year

*Argentina* According to the latest official reports, the condition of the flax crop was good in the whole of Argentina in August The area under flax during the 1931-1942 campaign amounts, according to the second official estimation published on September 17th, to 6,753,000 acres as compared with 6,760,000 acres in 1940-41 and with 7 301,000 acres on the average in the preceding five years The returns were 99,9 and 92 5.

*Canada.* According to the most recent estimate area cultivated to flax is 958 000 acres, against 307,000 in 1940 and 309,000 on the average of the preceding 5 year period; percentages: 311 1 and 310 5 The corresponding production of linseed is estimated at about 4,123,000 centals (7,362,000 bushels) against 1,786,000 (3 189,000) and 858,000 (1,533,000), percentages: 230.9 and 480.3

*United States:* According to the September Crop Report, the production of flaxseed in 1941 is estimated at 17,864,000 centals (31,000,000 bushels) against 17,482,000 (31,217,000) in 1940 and an average of 6,181,000 (11,037,000) in 1935 to 1939, percentages, 102.2 and 289.0.

*Uruguay:* Autumn weather has not favoured the tilling of the soil Instead, the dry and cold winter favoured the sowing of flax. The condition of the flax crop is thought to be a good one, although some damage has been done by heavy rains. The area under flax in 1941-42 amounts to 313,800 acres, as compared with 422,600 acres in 1940-41 and with 407,000 acres on the average in the foregoing five years. The return were 74.3 and 77.1.

## CURRENT INFORMATION ON COTTON.

*Bulgaria* At the middle of August, cotton plants had begun to blossom in good conditions. Crop prospects are favourable.

*Spain* Rainy weather has done damage to cotton in the province of Avila, which is a very important one for this crop.

*Romania:* The weather has not favoured cotton crops this year.

*United States* At the end of August conditions were fairly good for cotton, and by the first week of September cotton picking was general, though rains caused delay in some sections During the second week cotton crop was maturing rapidly with warm weather, and up to September 21 progress has been generally good.

The indicated area left for harvest this year is the smallest cotton acreage harvested since 1895. Total plantings have been 12 per cent. below the Agricultural Conservation Programme allotments. Several causes are responsible for this year's reduction in cotton acreage Frequent and heavy rains in Texas and Oklahoma throughout the spring prevented the planting of some intended acreage and resulted in the loss of some acreage which had already been planted The Supplementary Cotton Programme, in which farmers are given cotton stamps in return for making additional acreage reduction, was also a contributing factor in reducing acreage. In South Carolina the weather has been very unfavourable for cotton. Conditions have also been unfavourable in Georgia, Florida and Louisiana.

The crop is later than usual in nearly all States. In Texas and Louisiana, where unfavourable conditions prevailed at seeding time, the crop is frome one week to two weeks late and in most other States from about average to one week late This situation is markedly reflected in the figures concerning ginning progress

The prospective loss from boll weevil activity is the greatest one from this source since 1932 The damage is expected to be about twice as great as the 10 year average in all States where the presence of weevils creates a threat to the crop

### Summary of the Cotton Reports issued by the Government of the United States, during the cotton season (August 1-July 31)

| | Provisional estimates for dates indicated 1941-42 | Final estimates 1940 41 | Final estimates Average 1935 36 to 1939 40 | Percent 1941 42: 1940 41 = 100 | Percent 1941 42: Aver = 100 |
|---|---|---|---|---|---|
| *Report referring to July 1:* | | | | | |
| Area in cultivation (acres) | 23,519,000 | 24,871,000 | 28,496,000 | 94.6 | 82.5 |
| *Report referring to August 1:* | | | | | |
| Area left for harvest (acres) | (1) 23,10[illegible],000 | (2) 23,861,000 | (2) 27,788,000 | 96.8 | 83.1 |
| Crop condition (per cent. of normal) | 72 | 72 | (3) 72 | — | — |
| Production (4) | 10,817,000 | 12,565,000 | 13,148,000 | 86.1 | 82.3 |
| Yield of lint per acre, in lb. | 224.4 | 252.5 | (3) 205.4 | 88.9 | 109.3 |
| *Cotton ginned to August 1 (5)* | 1,966 | 32,187 | 114,716 | 6.1 | 1.7 |
| *Cotton ginned to August 16 (5)* | 74,101 | 169,420 | 342,307 | 43.7 | 21.6 |
| *Report referring to September 1:* | | | | | |
| Area left for harvest (acres) | (6) 22,633,000 | (2) 23,861,000 | (2) 27,788,000 | 94.9 | 81.4 |
| Crop condition (per cent. of normal) | 65 | 74 | (3) 63 | — | — |
| Production (4) | 10,710,000 | 12,565,000 | 13,148,000 | 85.2 | 81.5 |
| Yield of lint per acre, in lb | 226.8 | 252.5 | (3) 205.4 | 89.8 | 110.4 |
| *Cotton ginned to September 1 (5)* | 504,125 | 605,798 | 1,424,198 | 83.2 | 35.4 |
| *Cotton ginned to September 16 (5)* | 2,093,414 | 1,805,621 | 3,559,517 | 115.9 | 58.8 |

(1) Area in cultivation on July 1 less the ten-year (1931-40) average abandonment from natural causes, 1.9 per cent. — (2) Area actually harvested. — (3) Ten year (1930-39) average. — (4) In bales of 478 lb. net weight and exclusive of linters — (5) In running bales, counting round bales as half bales and exclusive of linters. — 6) Area in cultivation on July 1, 1941, less 3.8 per cent representing the area which has been, or will be abandoned from natural causes, after that date.

*Peru.* According to information given in the press, weather was not propitious to the cotton crops. Drought did damage to the plantations in the department of Ica. In the department of Lima, crops have suffered from the exceptionally low temperatures in winter. Besides, in the North of this department and in the department of Ancash, insects had damaged the cultures

*Egypt:* The 1941 cotton acreage is officially estimated at 1,706,200 acres, compared with 1,749,000 acres last year, and 1,821,100 on the average of the preceding 5 year period (1935-39), percentages: 97 6 and 93.7. The decrease of 2 4 per cent., or 42,800 acres, from last year's acreage is much below that of 10 or even 15 per cent forecast at the sowing season Furthermore, while in Upper-Egypt the decrease amounts to 25 per cent. and in Middle-Egypt to about 2 per cent , in the Nile Delta, or Lower Egypt, where are concentrated 70 per cent of the total cotton area, there is an increase of about 2 per cent , or 20,000 acres, with 1,180,000 acres in 1941 as against 1 160 000 acres in 1940

Data concerning the distribution of cotton acreage by varieties, which are officially issued on the first Monday of August, have not yet arrived However, from the information already at our disposal and herein above analysed, it is evident that the acreage under lovs staple varieties has been increased, while that producing *Uppers* varieties (Ashmuni and Zagôra) which cannot be marketed successfully by the time being has been largely reduced, at the advantage of sugar cane, or cereal crops

The first estimate of cotton production is due to be issued on October 6, 1941, the first Monday of the month Meantime, private estimates put it between 1 7 and 1 9 million bales of 478 lb vet weight , compared with 1 9 last year and on the average of the preceding 5 year period (1935 39)

## CURRENT INFORMATION ON HEMP.

*Spain* In the province of Alicante, the chief hemp growing region of Spain, lack of manure has hindered the normal growth of this crop.

*Hungary* About August 23rd, hemp cultivated chiefly for seed was being gathered in The grains are fairly well developped, and the yieldsion the whole a satisfactory one.

As to hemp cultivated mainly for spinning, an average yield of a fairly good quality was expected

*Romania* See "Flax"

## CURRENT INFORMATION ON TOBACCO.

*Belgium* The area under tobacco in 1940 is estimated at 5,070 acres against 5,700 acres in 1939 and an average of 6,810 acres in 1934 to 1938, percentages, 89.0 and 74.5.

*Bulgaria:* At the end of August, harvesting and drying of tobacco was proceeding. The output is expected to be a good one, both as to quantity and quality. The rains which fell about the middle of August have helped to avoid the *Trepsa* disease.

In order to fill the insufficient of comestible and industrial oils, the Bulgarian Government has encouraged this year the harvesting of tobacco seed by fixing its price at 12 leva the kg. It is expected that this year's harvest will yield some 4.5 millions of lb. of tobacco seed.

*Hungary:* About August 23rd, the tobacco plantations had a good aspect and the plants were beginning to blossom. At that time, the gathering in of the lower leaves had already begun. There was expected a yield above the average as to quantity, but only an average one as to quality

*Canada:* According to the latest estimate area cultivated to tobacco is 66,000 acres, against 67,880 in 1940 and 69,550 on the average of the preceding 5-year period, percentages 97.2 and 94.9. The corresponding production is estimated at about 67,300,000 lb against 60,000,000 and 76,769,000, percentages 112.2 and 87.7.

*United States:* According to the September Crop Report the production of tobacco in 1941 is estimated at 1,255,865,000 lb against 1,451,966,000 lb. in 1940 and an average of 1,453,120,000 lb in 1935 to 1939, percentages 86.5 and 86.4

*Turkey:* The production of tobacco in 1941 is estimated at 116,845,000 pounds against 145,506,000 in 1940 and an average of 125,073,000 in 1935 to 1939 percentages, 80.3 and 93.4

## CURRENT INFORMATION ON HOPS.

*Belgium:* The area under hops in 1940 is estimated at 1,820 acres against 1,990 acres in 1939 and an average of 2,165 acres in 1934 to 1938, percentages, 91.7 and 84.2.

*Hungary:* About August 23rd, an average yield of hops was foreseen At the same date, the crop was being harvested.

*United States:* According to the September crop Report, the production of hops in 1941 is estimated at 43,200,000 lb against 42,552,000 lb in 1940 and an average of 38,002,000 lb in 1935 to 1939; percentages, 101.5 and 113.7

## CURRENT INFORMATION ON OTHER PRODUCTS.

### Coffee.

*Brazil:* The Brazilian Government has established minimum prices for the various trade categories of coffee grown in the country

*Venezuela:* The production of coffee in 1940-41 is estimated at 1,257,000 pounds against 1,058,000 in 1939-40 and an average of 1,283,000 pounds in 1934-35 to 1938-39; percentages, 118.7 and 97.9. Crop condition of plantations in July was good.

### Colza.

*Hungary:* About the middle of August, sowing of winter rape was reported from many places.

### Soyabeans.

*Hungary:* About August 23rd, the condition of soy-bean crops was as follows. Weather had on the whole favoured the crops. At the said date, blossoming was already over. In some places, excessive rains had unfavourable consequences the fields being invaded by weeds. Cods were well developped, full and healthy. An output above the average was expected.

## CURRENT INFORMATION ON FODDER CROPS.

*Bulgaria.* The seed vetch and hay crops are good this year.

The mowing of permanent meadows was ended by the middle of August; many meadows will probably produce a second crop. The hay crop is a satisfactory one. Alfalfa fields have given good yields, three, four and even five mowings having taken place.

*Denmark* Owing to rains in August, the condition of all forage crops has much improved. The following table shows the condition of the crops, according to the system of the Institute, on September 1st, as compared with that of August 1st last and of September 1st 1940

| | Sept 1, 1941 | August 1, 1941 | Sept 1, 1940 |
|---|---|---|---|
| Mangold | 92 | 86 | 96 |
| Kolhrabi | 96 | 89 | 1) |
| Turnips | 95 | 90 | 93 |
| Alfalfa | 94 | 2) 91 | 3) |
| Meadows | 81 | 60 | 74 |

(2) 92 for the islands and [illegible] for Jutland — (1) On July 1st 1941 — (3) 94 for the islands and [illegible] Jutland

*Finland* At the beginning of August, the condition of fodder crops was below the average According to the local classification (5 average, 6 above average, 8 very good), the condition of the crops was estimated as follows artificial meadows, 4,2 on August 1st, as compared with 4,4 on July 1st permanent meadows 4,0 (4,3), other forage, 4,3

*Hungary* During the three weeks ending August 23rd, weather favoured the development of forage beet A quite satisfactory crop was expected at that time.

As to millet, buckwheat and sorghum, an average output was foreseen.

At the same date, the second mowing of clover had almost every-where given a good yield Clover for seed developped well, and an output somewhat above the average was looked for The second mowing of alfalfa has given a satisfactory yield of an excellent quality A good output of alfalfa seed was also expected.

Green forage maize gave a very high yield. Late sown crops were scarce in many places.

Early moha sowings looked well, and the formation of grains was satisfactory. Late ones and those sown on flooded land were on the whole scarce

The hay yield of permanent meadows was wery copious in the country taken as a whole, but its quality was only an average one. After-grass grew well in many places.

At the time under consideration, the vegetation of pasture land was strong, and the quality of the grass a good one, except on damp soil

About September 13th, the gathering in of forage was ended almost everywhere. Hay is everywhere of a satisfactory quality.

*Norway:* The condition of the main forage crops was on September 1st, according to the system of the Institute, as follows: artificial meadows, 82, permanent meadows, 89; forage turnips, 98; kohlrabi, 97; mangold, 90.

*Romania*: About September 10th, pasture land and untilled stubble land gave sufficient food to the cattle.

Within the programme of reshaping animal husbandry, the competent authorities insisted upon the necessity of creating artificial meadows upon communal pasture land.

*Slovakia*: The Central Bureau of Statistics of Slovakia has recently published final data relating to the harvested areas and to the output of the main forage crops in the years 1940, 1939 and 1938. They are shown in the following table.

*Area* (thousand acres)

| | 1940 | 1939 | 1938 | % 1940: 1939 = 100 | % 1940: 1938 = 100 |
|---|---|---|---|---|---|
| Permanent meadows | 605 | 682 | 721 | 97.4 | 92.2 |
| Clover | 324 | 320 | 328 | 101.3 | 98.6 |
| Mangels | 60 | 65 | 58 | 93.3 | 103.7 |

*Production*

| | | | 1940 | 1939 | 1938 | % 1940: 1939 = 100 | % 1940: 1938 = 100 |
|---|---|---|---|---|---|---|---|
| Permanent meadows | 1,000 | centals | 19,827 | 20,462 | 24,419 | 96.9 | 81.2 |
| | 1,000 | short tons | 991 | 1,023 | 1,221 | | |
| Clover | 1,000 | centals | 15,602 | 14,504 | 14,516 | 107.6 | 107.5 |
| | 1,000 | short tons | 780 | 725 | 726 | | |
| Mangels | 1,000 | centals | 11,291 | 14,614 | 12,567 | 77.3 | 89.8 |
| | 1,000 | short tons | 565 | 731 | 628 | | |

*Sweden*. The production of hay on rotation meadows in 1941 is estimated at 45,739,000 centals (2,287,000 short tons) against 69,028,000 (3,451,000) in 1940 and an average of 111,404,000 (5,570,000) in 1935 to 1939, percentages 66.3 and 41.1. The corresponding figures for hay of permanent meadows are 6,865,000 (343,000), 7,363,000 (368,000), 12,064,000 (603,000), 93.2 % and 56.9 %.

*Switzerland*: Owing to the great dampness, the growth of grass progressed well both on permanent and on artificial meadows, so that, as far as quantity is concerned, the crop of after-grass is estimated to be from average to good. The gathering in of this crop was rather late, and this is likely to have an unfavourable influence upon the harvest of autumn grass. Mountain meadows have suffered from frost and from early snowfalls.

*Argentina*: The condition of the meadows was normal in August.

*United States*: According to the September Crop Report, the production of tame hay in 1941 is estimated at 1,706,000,000 centals (85,300,000 short tons) against 1,726,240,000 (86,312,000) in 1940 and an average of 1,489,080,000 (74,454,000) in 1935 to 1939; percentages, 98.8 and 114.6. The production of wild hay in 1941 is estimated at 219,300,000 centals (10,965,000 short tons) against 176,880,000 (8,844,000) in 1940 and an average of 187,656,000 (9,383,000) in 1935 to 1939; percentages, 124.0 and 116.9.

# *LIVESTOCK AND DERIVATIVES*

## TRADE AND PRIVATE TAXED SLAUGHTERINGS [1] AND RELATIVE PRODUCTION OF MEAT AND FAT IN SLOVAKIA.

| Classification | Trade slaughterings | | Private slaughterings (2) | | Total (2) | |
|---|---|---|---|---|---|---|
| | 1940 | 1939 | 1940 | 1939 | 1940 | 1939 |
| | | | HEAD | | | |
| *Animal slaughtereds:* | | | | | | |
| Adult cattle | 106,296 | 85,563 | 12,507 | 9,048 | 118,803 | 94,611 |
| Calves | 138,994 | 120,232 | 3,859 | 3,836 | 142,853 | 124,068 |
| Pigs | 259,816 | 243,414 | 29,277 | 18,547 | 289,093 | 261,961 |
| Adult sheep | 34,142 | 41,285 | 1,712 | 2,399 | 35,854 | 43,684 |
| Lambs | 27,538 | 35,467 | 4,439 | 6,611 | 31,977 | 42,078 |
| Adult goats | 3,460 | 3,030 | 455 | 453 | 3,915 | 3,483 |
| Kids | 5,567 | 11,249 | 3,137 | 3,125 | 8,704 | 14,374 |
| Horses and mules | 765 | 1 100 | 140 | 132 | 905 | 1 232 |
| Colts and asses | 46 | 49 | — | 2 | 46 | 51 |
| | | | LIVE WEIGHT (*centals*) | | | |
| *Animals slaughtered:* | | | | | | |
| Adult cattle | 748,913 | 621,274 | 54,957 | 39,555 | 803,870 | 660,829 |
| Calves | 153,215 | 132,534 | 4,255 | 4,228 | 157,470 | 136,762 |
| Pigs | 589,919 | 412,760 | 50,817 | 28,936 | 640,736 | 441,696 |
| Adult sheep | 22,582 | 27,307 | 1,133 | 1,587 | 23,715 | 28,894 |
| Lambs | 2,430 | 3,128 | 392 | 582 | 2,822 | 3,710 |
| Adult goats | 2,288 | 2,004 | 302 | 300 | 2,590 | 2,304 |
| Kids | 492 | 992 | 276 | 276 | 768 | 1,268 |
| Horses and mules | 5,084 | 7,330 | 930 | 884 | 6 014 | 8,214 |
| Colts and asses | 77 | 82 | — | 4 | 77 | 86 |
| | | | PRODUCTION (*centals*) | | | |
| *Meat* | | | | | | |
| Beef | 467,115 | 386,503 | 34,842 | 25,051 | 501,957 | 411,554 |
| Veal | 102,143 | 88,355 | 2,837 | 2,820 | 104,980 | 91,175 |
| Pork | 361,819 | 276,809 | 33,945 | 20,033 | 395,764 | 296,842 |
| Mutton | 13,700 | 16,566 | 688 | 963 | 14,388 | 17,529 |
| Lamb | 1,620 | 2,086 | 262 | 388 | 1,882 | 2,474 |
| Goat meat | 1,464 | 1,283 | 192 | 192 | 1,656 | 1,475 |
| Kid meat | 328 | 661 | 183 | 183 | 511 | 844 |
| Horse meat | 3,389 | 4,888 | 620 | 589 | 4,009 | 5,477 |
| Colt meat | 51 | 55 | — | 2 | 51 | 57 |
| *Fat:* | | | | | | |
| Beef fat | 32,157 | 27,677 | 1,797 | 1,318 | 33,954 | 28,995 |
| Porc fat | 169,111 | 94,676 | 11,790 | 6,010 | 180,901 | 100,686 |
| Mutton fat | 1,356 | 1,638 | 71 | 95 | 1,427 | 1,733 |
| Goat fat | 62 | 53 | 9 | 9 | 71 | 62 |

(1) Figures based on information furnished by the taxes services. — (2) Excluding small livestock for the consumption of breeders and permanent labour in the agricultural holdings.

## LIVESTOCK IN SLOVAKIA.

| Classification | Estimate at 1 January 1940 | Classification | Estimate at 1 January 1940 |
|---|---|---|---|
| *Horses* | *166,648* | *Cattle* | *914,056* |
| Horses under 1 year old: | | Calves under 1 year old | 158,781 |
| Colts | 5,509 | Cattle 1 year old and over: | |
| Fillies | 5,355 | Bulls | 17,819 |
| Horses from 1 to 3 years old: | | Heifers not covered | 57,059 |
| Stallions | 8,493 | Heifers in calf | 35,368 |
| Geldings | 9,653 | Steers | 36,197 |
| Mares | 12,139 | Cattle 2 years old and over: | |
| Horses from 3 to 15 years old: | | Bulls | 5,250 |
| Stallions: | | Heifers not covered | 16,339 |
| for breeding | 1,216 | Heifers in calf | 30,035 |
| others | 4,176 | Steers | 80,618 |
| Geldings | 54,914 | Cows | |
| Mares | 48,187 | for reproduction | 469,142 |
| Horses 15 years old and over: | | other | 7,448 |
| Stallions: | | Cows for work | (150,114) |
| for breeding | 201 | Steers for work | (77,371) |
| others | 858 | | |
| Geldings | 10,021 | *Sheep* | *306,812* |
| Mares | 5,926 | Sheep under 6 months old | 12,672 |
| | | Sheep 6 months old and over: | |
| | | Rams | 5,853 |
| *Asses* | *268* | Wethers | 8,920 |
| | | Ewes | 279,367 |
| *Hinnies* | *28* | *Pigs* | *449,362* |
| | | Brood sows: | |
| | | Brood sows from 6 months to 1 year old | 40,052 |
| *Mules* | *27* | Brood sows 1 year and over | 49,503 |
| | | Other pigs: | |
| *Goats* | *79,966* | Sucking pigs unders 8 weeks old | 80,667 |
| He-goats | 1,267 | Pigs 8 weeks old and less than 6 months | 191,726 |
| She-goats for reproduction | 76,726 | Pigs 6 months old and over | 85,622 |
| Others goats | 1,973 | Pigs for breeding | 1,792 |

## WOOL SHORN IN THE UNITED STATES IN 1941

The quantity of wool shorn and to be shorn in 1941 is estimated by the United State's Department of Agriculture at 399,941,000 pounds. This is the largest United States production of shorn wool, being 3.1 per cent. larger than the previous high production in 1940 (387,763,000 lb.), and 9.1 per cent. above the 10-year (1930-39) average (366,488,000 lb.). The estimate does not include wool pulled from slaughtered sheep and lambs, which has averaged 64 million pounds annually in recent years. The larger production this year compared with last year is a result both of an increased number of sheep shorn and of a larger average weight of wool per sheep shorn. The number of sheep shorn and to be shorn in 1941 is estimated at 48,900,000 head, compared with 48,479,000 head in 1940, and a 10-year (1930-39) average of 46,035,000 head; percentages: 100.9 and 106.2. The estimated average weight of wool per sheep shorn is 8.18 pounds this year, compared with 8.00 pounds in 1940 and the 10-year (1930-39)

average of 7.96; percentages: 102.2 and 102.8. Both the number shorn and the weight of wool per sheep in 1941 establish new high records.

The number of sheep shorn and the quantity of wool shorn in 1940 and 1941 are based upon the Department of Agriculture's estimates of the number of stock sheep on farms on January 1 (See: Monthly Crop Report, March 1941, p. 121) and have not been revised on the basis of the number of sheep on farms on April 1, 1940, as enumerated by the Census of Agriculture (See: Monthly Crop Report, May 1941, p. 263).

## CURRENT INFORMATION ON LIVESTOCK AND DERIVATIVES.

*Bulgaria:* At the middle of August, the milk producing capacity of the ewes, although somewhat decreased, was still satisfactory. The milk producing capacity of goats was good. The interest in pig breeding has increased in the country and even in the towns.

Egg laying was satisfactory last summer, and in some places it even slightly increased at harvest time.

The condition of apiculture was on the whole satisfactory in summer. However, in some regions which suffered from drought or from excessive rains, it has proved necessary to feed bees artificially with sugar.

Bee swarms were in a good condition at the middle of August. The yield of honey, although of a good quality, was not altogether satisfactory as to quantity. Swarmings were satisfactory.

*Argentina.* The health of the cattle was normal in August in the whole country.

According to an official estimation, the wool stocks existing in the country on January 1st 1941 amounted to 128,530,000 lbs. as compared with 128,104,000 lbs. at the same time last year. The average wool output was in the last years about 374,787,000 lbs.

## CURRENT INFORMATION ON SERICULTURE.

*Bulgaria.* The Agricultural and Co-operative Bank has received the whole of the first crop of cocoons, which was smaller than last year. The forthcoming for the second crop was ended. The stringing of cocoons for sowing was also ended by the middle of August.

# TRADE

| COUNTRIES | July | | | | Twelve months (August 1-July 31) | | | | July | | | | Twelve months (August 1-July 31) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Exports | | Imports | | Exports | | Imports | | Exports | | Imports | | Exports | | Imports | |
| | 1941 | 1940 | 1941 | 1940 | 1940-41 | 1939-40 | 1940-41 | 1939-40 | 1941 | 1940 | 1941 | 1940 | 1940-41 | 1939-40 | 1940-41 | 1939-40 |
| **Wheat.** | | | | | | | | | | | | | | | | |
| | Thousand centals (1 cental = 100 lb.) | | | | | | | | Thousand bushels of 60 lb. | | | | | | | |
| Sweden . . . | — | — | 0 | 26 | — | — | 277 | 871 | — | — | 0 | 43 | — | — | 401 | 1,451 |
| Romania . . . | 0 | 70 | 0 | 0 | 18 | 18 446 | 0 | 0 | 0 | 117 | 0 | 0 | 30 | 30,743 | 0 | 0 |
| United States. | 18 | 1,125 | 813 | 378 | 5,376 | 13,496 | 6,870 | 5,813 | 30 | 1,876 | 1,354 | 630 | 8,960 | 22,493 | 11,450 | 9,688 |
| Argentina . . | 5,600 | 7,934 | — | — | 56 036 | 104,788 | — | — | 9,332 | 13,224 | — | — | 93,392 | 174,643 | — | — |
| **Wheat Flour.** | | | | | | | | | | | | | | | | |
| | Thousand centals (1 cental = 100 lb.). | | | | | | | | Thousand barrels of 196 lb. | | | | | | | |
| United States. | 994 | 755 | 0 | 7 | 12,691 | 11,759 | 114 | 129 | 507 | 385 | 0 | 4 | 6,475 | 6,0 0 | 58 | 66 |
| Argentina . . | 51 | 121 | — | — | 1 022 | 1,951 | — | — | 26 | 62 | — | — | 522 | 995 | — | — |
| **Total Wheat and Flour †).** | | | | | | | | | | | | | | | | |
| | Thousand centals (1 cental = 100 lb.). | | | | | | | | Thousand bushels of 60 lb. | | | | | | | |
| | Net Exports (*) | | Net Imports (**) | | Net Exports (*) | | Net Imports (**) | | Net Exports (*) | | Net Imports (**) | | Net Exports (*) | | Net Imports (** | |
| United States. | 530 | 1,744 | — | — | 15,275 | 23,190 | — | — | 884 | 2,907 | — | — | 25,458 | 38,649 | — | — |
| Argentina . . | 5.667 | 8,096 | — | — | 57,399 | 107,389 | — | — | 9,445 | 13,494 | — | — | 95,664 | 178,979 | — | — |
| **Rye.** | | | | | | | | | | | | | | | | |
| | Thousand centals (1 cental = 100 lb.). | | | | | | | | Thousand bushels of 56 lb. | | | | | | | |
| | Exports | | Imports | | Exports | | Imports | | Exports | | Imports | | Exports | | Imports | |
| Sweden . . . | — | — | 0 | 0 | — | — | 835 | 525 | — | — | 0 | 0 | — | — | 1,491 | 937 |
| Romania . . . | 0 | 124 | 0 | 0 | 24 | 2,198 | 0 | 0 | 0 | 222 | 0 | 0 | 43 | 3,925 | 0 | 0 |
| United States. | 0 | 1 | 24 | 0 | 137 | 411 | 803 | 0 | 0 | 1 | 43 | 0 | 244 | 733 | 1,435 | 0 |
| Argentina . . | 1 | 7 | — | — | 1,002 | 5,714 | — | — | 2 | 12 | — | — | 1,789 | 10,203 | — | — |
| **Barley.** | | | | | | | | | | | | | | | | |
| | Thousand centals (1 centals = 100 lb.). | | | | | | | | Thousand bushels of 48 lb | | | | | | | |
| Romania . . . | 0 | 0 | 0 | 0 | 1,138 | 2,607 | 1 | 0 | 0 | 0 | 0 | 0 | 2,370 | 5,430 | 3 | 0 |
| United States. | 0 | 74 | 0 | 26 | 232 | 1,747 | 564 | 290 | 0 | 155 | 0 | 58 | 483 | 3,639 | 1,175 | 604 |
| Argentina . . | 133 | 171 | — | — | 2,164 | 8.850 | — | — | 277 | 356 | — | — | 4,509 | 18,439 | — | — |

(*) Excess of exports over imports. — (**) Excess of imports over exports.
(†) Flour reduced to grain on the basis of the coefficient: 1,000 centals of flour = 1,333.333 centals of grain. (Thousand barrels of flour = 4,355.55 bushels of grain).

| COUNTRIES | July | | | | Twelve months (August 1-July 31) | | | | July | | | | Twelve months (August 1 July 31) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Exports | | Imports | | Exports | | Imports | | Exports | | Imports | | Exports | | Imports | |
| | 1941 | 1940 | 1941 | 1940 | 1940 41 | 1939-40 | 1940 41 | 1939-40 | 1941 | 1940 | 1941 | 1940 | 1940-41 | 1939 40 | 1940 41 | 1939-40 |
| **Oats.** | | | | | | | | | | | | | | | | |
| | Thousand centals (1 cental 100 lb) | | | | | | | | Thousand bushels of 32 lb | | | | | | | |
| Sweden | — | — | 25 | 25 | — | — | 695 | 260 | — | — | 77 | 78 | — | — | 2,172 | 812 |
| United States | 43 | 3 | 93 | 366 | 50 | 65 | 2,995 | 3 635 | 8 | 10 | 290 | 1,144 | 158 | 202 | 9,360 | 11,360 |
| Argentina | 338 | 91 | ... | | 1,549 | 8,284 [1] | 8 [1] | 9 | 1,055 | 284 | ... | | 4,841 | 25 887 [1] | 25 [1] | 27 |
| **Maize.** | | | | | | | | | | | | | | | | |
| | Thousand centals (1 cental 100 lb) | | | | Nine Months (November 1 July 31) | | | | Thousand bushels of 56 lb. | | | | Nine months (November 1 July 31) | | | |
| Romania | 68 | 2 308 | 0 | 0 | 2,956 | 12,054 | 0 | 0 | 122 | 4 121 | 0 | 0 | 5 278 | 21 524 | 0 | 0 |
| United States | 758 | 3 735 | 51 | 284 | 2 843 | 18 339 | 505 | 537 | 1,354 | 6 670 | 91 | 506 | 5,076 | 32 749 | 901 | 958 |
| Argentina | 71 | 2 325 | — | — | 9 100 | 40 045 | — | — | 126 | 4,151 | — | — | 16,250 | 71 510 | — | — |
| **Rice.** | | | | | | | | | | | | | | | | |
| | Thousand centals (1 cental 100 lb) | | | | Seven Months (January 1-July 31) | | | | Thousand bushels of 45 lb | | | | Seven Months (January 1 July 31) | | | |
| | | | | | 1941 | 1940 | 1941 | 1940 | | | | | 1941 | 1940 | 1941 | 1940 |
| United States | 228 | 248 | 25 | 23 | 2,589 | 1,991 | 100 | 239 | 506 | 551 | 56 | 50 | 5 754 | 4,423 | 222 | 532 |
| Argentina | 0 | 0 | | . | 11 | 3 [1] | 42 [1] | 24 | 0 | 0 | . | | 24 | 6 [1] | 93 [1] | 52 |
| **Linseed.** | | | | | | | | | | | | | | | | |
| | Thousand centals (1 cental 100 lb). | | | | | | | | Thousand bushels of 56 lb | | | | | | | |
| United States | — | — | 588 | 370 | — | — | 4,687 | 4,820 | — | — | 1,051 | 661 | — | — | 8,371 | 8,608 |
| Argentina | 1,199 | 192 | .. | ... | 6,305 | 13 721 [1] | 0 [1] | 0 | 2 142 | 543 | | . | 11 260 | 24,503 [1] | 0 [1] | 0 |
| **Cotton.** | | | | | | | | | | | | | | | | |
| | Thousand centals (1 cental - 100 lb) | | | | Twelve months (August 1-July 31) | | | | Thousand bales of 478 lb | | | | Twelve months (August 1 July 31) | | | |
| | | | | | 1940-41 | 1939-40 | 1940-41 | 1939-40 | | | | | 1940-41 | 1939 40 | 1940-41 | 1939-40 |
| United States | 309 | 714 | 86 | 91 | 5,861 | 32,535 | 965 | 841 | 65 | 149 | 18 | 19 | 1 226 | 6,806 | 202 | 176 |
| Argentina | 15 | 140 | ... | ... | 664 | 573 [1] | 8 [1] | 5 | 3 | 29 | | ... | 139 | 120 [1] | 2 [1] | 1 |
| | Thousand lb. | | | | | | | | | | | | | | | |
| | **Wool.** | | | | | | | | **Butter.** | | | | | | | |
| | | | | | Eleven months (September 1-July 31) | | | | | | | | Seven months (January 1 July 31) | | | |
| | | | | | 1941 | 1940 | 1941 | 1940 | | | | | 1941 | 1940 | 1941 | 1940 |
| Denmark | ... | ... | ... | ... | ... | .. | ... | .. | 13,448 | 17,858 | — | — | 82,453 | 177,834 | — | — |
| United States | 0 | 2 | 72,008 | 17,503 | 4 | 483 | 688,385 | 296,185 | 313 | 240 | 134 | 53 | 1,552 | 1,543 | 1,184 | 675 |
| Argentina a) | 10,726 | 5,311 | — | — | 304,204 | 195,606 | — | — | 450 | 4,167 | — | — | 24,315 | 18,111 | — | — |
| Argentina b) | 5,194 | 3,569 | — | — | 84,239 | 68,531 | — | — | | | | | | | | |

[1] Up to May 31

| COUNTRIES | July | | | | Seven months (January 1 July 31) | | | | July | | | | Ten months (October 1 July 31) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Exports | | Imports | | Exports | | Imports | | Exports | | Imports | | Exports | | Imports | |
| | 1941 | 1940 | 1941 | 1940 | 1941 | 1940 | 1941 | 1940 | 1941 | 1940 | 1941 | 1940 | 1940 41 | 1939-40 | 1940 41 | 1939-40 |
| | **Cheese.** | | | | | | | | **Cacao.** | | | | | | | |
| United States | 14,013 | 185 | 2,094 | 1,781 | 35,499 | 1,133 | 13,274 | 23,283 | — | — | 56,489 | 92 255 | — | — | 719 622 | 530 494 |
| Argentina | 3,397 | 1,138 | . . | . . | 17,686 | 4,176 | 2) 2 | 2) 9 | — | — | .. | . . | — | — | 2) 7 895 | 2) 6 834 |
| | **Tea.** | | | | | | | | **Coffee.** | | | | | | | |
| | | | | | Twelve months (July 1 June 30) | | | | | | | | Twelve months (July 1 June 30) | | | |
| | | | | | 1940-41 | 1939 40 | 1940 41 | 1939 40 | | | | | | | | |
| United States | — | — | 10 679 | 7,315 | — | — | 101 689 | 100 075 | 249 | 597 | 78,024 | 183,943 | 10 836 | 12,253 | 2526085 | 2043624 |
| Argentina | — | — | | ... | — | — | 1) 3 177 | 1) 4 747 | — | — | . | | — | — | 2)55 279 | 2)53 273 |
| Brazil | — | — | — | — | — | — | — | — | 44 377 | 91,075 | — | — | 1678,892 | 1996 592 | — | — |
| Colombia | — | — | — | — | — | — | — | — | 1)45812 | 1)56333 | — | — | 582,192 | 505 008 | — | -- |
| Ecuador | — | — | — | — | — | — | — | — | 1) 1356 | 1) 767 | — | — | | 29 661 | — | — |
| Venezuela | — | — | — | — | — | — | — | — | 1) 2540 | 1) 4689 | — | — | 98 287 | 47 351 | — | — |

(a) Unswashed wool — (b) Washed wool

1) Up to June 31 — 2) Up to May 31

## URUGUAY

### Trade for the six months January 1-June 30 1941 and 1940.

| Products and units | | June | | Six months (January 1 June 30) | |
|---|---|---|---|---|---|
| | | 1941 | 1940 | 1941 | 1940 |
| | **Exports** | | | | |
| Wheat | 1000 bush of 60 lb | 0 | 0 | 0 | 480 |
| Wheat flour | 1000 barrels 196 » | 0 | 0 | 0 | 16 |
| Maize | 1000 bush 56 » | 0 | 0 | 0 | 39 |
| Rice | 1000 45 » | 0 | 0 | 84 | 0 |
| Linseed | 1000 56 » | 417 | 176 | 2 370 | 2 515 |
| Wool, unwashed | 1000 lb | 5 029 | 1,385 | 62 453 | 45 184 |
| » washed | » | 1,887 | 939 | 9 222 | 18,764 |
| Cheese | » » | 35 | 53 | 293 | 119 |
| | **Imports** | | | | |
| Wheat | 1000 bush of 60 lb | 96 | 0 | 522 | 0 |
| Oats | 1000 32 » | 90 | 14 | 332 | 21 |
| Maize | 1000 bush 56 » | 4 | 0 | 664 | 0 |
| Cotton | 1000 bales 478 » | 0 | 0 | 0 | 7 |
| Cheese | 1000 lb | 0 | 2 | 0 | 13 |
| Cacao | » » | 20 | 20 | 642 | 602 |
| Tea | » » | 26 | 51 | 165 | 375 |
| Coffee | » » | 1) 511 | 538 | 2) 2,590 | 3 049 |

1) May — 2) January 1-May 31

# STOCKS

## Commercial cereals in store in Canada and the United States.

| Products and location | Sept 1941 | August 1941 | July 1941 | Sept 1940 | Sept 1939 | Sept 1941 | August 1941 | July 1941 | Sept 1940 | Sept 1939 |
|---|---|---|---|---|---|---|---|---|---|---|
| | Friday or Saturday nearest 1st of month ([1]) | | | | | | | | | |
| | thousand centals | | | | | thousand bushels | | | | |
| **Wheat** | | | | | | | | | | |
| Canadian in Canada | | 259 502 | 259 328 | 163 422 | 81 476 | | 423 504 | 432 213 | 272 370 | 135 793 |
| U S in Canada | | 0 | 137 | 374 | 347 | | 0 | 228 | 624 | 579 |
| U S in the United States ([2]) | 164 760 | 148 021 | 91 138 | 108 031 | 99 773 | 274 600 | 246 702 | 151 896 | 180 052 | 166 289 |
| Canadian in the United States | 15 489 | 17 897 | 20 526 | 16 696 | 4 113 | 25 815 | 29 829 | 34 210 | 27 826 | 6 855 |
| Total | | *425 420* | *371 129* | *288 523* | *185 709* | | *709 035* | *618 547* | *480 372* | *309 516* |
| **Rye** | | | | | | | | | | |
| Canadian in Canada | | 759 | 928 | 91 | 998 | | 1 356 | 1 657 | 1 631 | 1 782 |
| U S in Canada | | 13 | 15 | 15 | 13 | | 24 | 24 | 24 | 24 |
| U S in the United States ([2]) | 8 197 | 6 203 | 3 158 | 5 1[illegible]0 | 5 178 | 14 637 | 11 077 | 5 639 | 9 142 | 9 246 |
| Canadian in the United States | 646 | 665 | 2 329 | 1 875 | 619 | 1 154 | 1 188 | 4 159 | 3 345 | 1 106 |
| Total | | *7 640* | *[illegible] 428* | *7 [illegible]19* | *6 808* | | *13 645* | *11 479* | *14 142* | *12 158* |
| **Barley** | | | | | | | | | | |
| Canadian in Canada | | 1 830 | 2 088 | 2 085 | 3 479 | | 3 812 | 4 349 | 4 343 | 7 248 |
| U S in Canada | | 0 | 0 | 0 | 7 | | 0 | 0 | 0 | 14 |
| U S in the United States ([2]) | 2 617 | 2 627 | 2 367 | 4 9[illegible] | 8 114 | 5 514 | 5 471 | 4 931 | 10 254 | 16 904 |
| Canadian in the United States | 42 | 96 | 40 | 5[illegible] | 0 | 87 | 200 | 84 | 1 180 | 0 |
| Total | | *4 553* | *4 495* | *7 573* | *11 600* | | *9 483* | *9 364* | *15 777* | *4 166* |
| **Oat** | | | | | | | | | | |
| Canadian in Canada | | 1 343 | 1 398 | 1 [illegible]33 | [illegible] 307 | | 4 197 | 4 369 | 4 791 | 7 210 |
| U S in Canada | | 20 | 29 | [illegible] | 20 | | 63 | 90 | 18 | 62 |
| U S in the United States | 3 767 | 2 345 | 1 250 | 2 68[illegible] | 4 698 | 11 771 | 7 328 | 3 906 | 8 395 | 14 681 |
| Canadian in the United States | 139 | 117 | 1[illegible]5 | 78 | 8 | 434 | 366 | 517 | [illegible]44 | [illegible]4 |
| Total | | *3 825* | *2 842* | *4 303* | *7 033* | | *11 954* | *8 862* | *13 448* | *21 977* |
| **Maize** | | | | | | | | | | |
| U S in Canada | | 1 385 | 537 | 2 414 | 2 145 | | 2 474 | 959 | 4 311 | 3 831 |
| Argentine in Canada | | | | | 2 | | | | | 4 |
| South African in Canada | | | | | 441 | | | | | 787 |
| Australian in Canada | | | | | 7 | | | | | 12 |
| U S in the United States ([2]) | 22 450 | 24 473 | 29 737 | 15 747 | 7 948 | 40 090 | 43 701 | 53 102 | 28 [illegible]19 | 14 192 |
| Total | | | | | *10 543* | | | | | *18 82[illegible]* |

([1]) Friday for Canada, Saturday for the United States ([2]) As from August 1941 including 4 central and southwestern [illegible] not reported previously

## Cotton stocks on hand in the United States.

| Location | August 1941 | July 1941 | June 1941 | August 1940 | August 1939 | August 1941 | July 1941 | June 1941 | August 1940 | August 1939 |
|---|---|---|---|---|---|---|---|---|---|---|
| | Last day of month | | | | | | | | | |
| | thousand centals | | | | | thousand running bales (counting round as half bales) | | | | |
| In consuming establishments | 8 339 | 9 209 | 9,426 | 3 623 | 3 211 | 1 697 | 1,874 | 1 918 | 738 | 654 |
| In public storage and at compresses | 45,732 | 47 735 | 51 998 | 44 865 | 58 076 | 9 297 | 9 704 | 10 570 | 9 120 | 11,805 |
| Total | *54 071* | *56 944* | *61,424* | *48 488* | *61 287* | *10,994* | *11 578* | *12 488* | *9 858* | *12 459* |

# PRICES

## PRICES OF CEREALS OF THE 1941 CROP

In the following pages some new data about fixation of prices of the 1941 crop in Spain and Finland and some supplementary information regarding prices in Bulgaria, France, Greece, Hungary, the Netherlands and Rumania, published already in August number, will be given

### Bulgaria.

An Order of the Cabinet Council establishes that the Direction of Purchase and Export of Cereals will also pay fixed prices for *maize*. the base price is to be lewa 400 per quintal.

### Spain.

By Order of August 15, 1941, the Government established the entering into force of the base prices, fixed by the Ministry of Agriculture in carrying out the regulations of the decrees of August 23, 1937, and of October 27, 1939, for all cereals and pulse crops for seed harvested in 1941 These prices are paid by the Governmental Wheat Office, (Servicio Nacional del Trigo), charged also this year with the acquisition of all quantities of cereals and pulse crops for seed They are valid from July 1, 1941, to June 30, 1942 Each producer or holder is obliged to give an exact declaration of his stocks, the quantities required for each holding can be retained.

To avoid any rise, prices have been kept at the same level as last year. There has been instituted, however, a system of premiums in favour of wheat producers in order to compensate them for possible losses and to encourage production The base prices for cereals are for sound and well cleaned merchandise, in bulk, f o r. deposit of the Governmental Wheat Office at the points indicated for each product

| | | | | |
|---|---|---|---|---|
| *Wheat*, type "Arévalo" and similar half-soft wheat, specific weight 77 kg, with at maximum 3 % impurities | at Valladolid | Pesetas | 84.00 | per quintal, |
| *Rye* | » Léon | » | 70.00 | » ; |
| *Fodder barley* | » Valladolid | » | 51.50 | » ; |
| *Oats*, current quality | » Sevilla | » | 48.50 | » , |
| *Maize*, current quality | » Sevilla | » | 70.00 | » , |
| *Millet* | » Sevilla | » | 52.00 | » ; |
| *Sorghum* | » Sevilla | » | 52.00 | » . |

The Order provides for increases and reductions for different commercial varieties with special regard to quality and region of production As from January 1, 1942, these prices undergo a reduction of 1 Peseta per quintal. Products are to be delivered not later than February 28, 1942.

In case of impurities less than 1 per cent., the wheat price is augmented by Peseta 1.50 per quintal and in case of more than 1 per cent. but less than 2 per cent. by Peseta 0 75. The price of wheat with more than 3 per cent. but less than 6 per cent impurities will be reduced proportionally

The Governmental Wheat Office pays a supplement of Pesetas 5 00 for wheat grown in the provinces of Cadiz, Huelva, Jaén, Malaga, Grenada and Badajoz and of Pesetas 10 00 per quintal for wheat produced in the regions inundated last winter either in these or in other provinces. The payment of this supplement to producers in Andalusia, Estremadura, Murcia, Albacete, Alicante and Valencia will be made only on delivery of the products before November 1, 1941. For the rest of the country the date of delivery has been established at December 1, 1941.

Furthermore, the Governmental Wheat Office will, for the distribution of selected seeds, fertilisers, livestock and labourers take into consideration first the requests of those wheat producers, who increase their wheat area in comparison with last year or deliver their produce at the earliest possible moment to the deposits of the Governmental Wheat Office.

**Finland.**

By Order of May 26, the Government has charged the Governmental Cereal Office with the acquisition of all quantities of wheat, rye, barley, oats and edible peas of the 1941 crop, to be offered between September 1, 1941, and July 31, 1942.

The producer's minimum prices for merchantable produce, f.o.r. nearest station, are.

| | | | |
|---|---|---|---|
| *Spring wheat* | Finmarks | 350 | per quintal, |
| *Winter wheat* | » | 340 | » . |
| *Rye* | » | 340 | » |
| *Barley* grown in Lapponian regions of the province of Oulu (Uleåborg) | » | 330 | » ; |
| *Barley* grown in the other regions of the province of Oulu | » | 320 | » . |
| *Barley* grown in any of the other provinces of the country | » | 310 | » ; |
| *Oats* | » | 260 | ; |
| *Peas, green* | » | 560 | » ; |
| *Peas, white* | » | 500 | » . |

The base qualities to which these prices refer as well as the increases and reductions resulting from differences in quality will be fixed by the Minister of Agriculture. The obligatory acquisition by the Governmental Cereal Office as well as the prices established, refer exclusively to cereals delivered on the grower's initiative or on the basis of a special arrangement. For cereals retained, prices can be reduced.

**France.**

With a view to preventing that the increase in cereal prices results in an increase in the bread price, the Government takes on her accaunt a considerable part of the amount paid to producers of bread cereals: frs. 84.80 in the case of *wheat*, frs. 71.50 in that of *rye*

**Greece.**

The producer's price of *wheat* has been increased from Drachme 14.00 to Drachme 27.00 per oka (1 oka = 1.34 liter). The price for *maize* has been fixed at Drachme 24.00 per oka.

**Hungary.**

The Commissioner for Prices has fixed the producer's price for barley of superior quality:

| | | | |
|---|---|---|---|
| *Barley, malting* . . . . . . . . . . . . . . . . . . . | Pengö | 30.00 | per quintal; |
| » » , "Prima" . . . . . . . . . . . | » | 31.00 | » ; |
| » » , "Extra" . . . . . . . . . . . | » | 32.00 | » . |

These prices remain in force until July 1942 for delivery f.o.r. Budapest and Marosvásárhely. For delivery to other stations or collecting points reductions relating to transport costs are provided for.

**Netherlands.**

In the August number of this Crop Report we noted that a premium for early threshing, amounting to florins 0.30 per quintal for deliveries made until the end of November, as well as a supplement for stocking is granted. As from September 7, this supplement amounts to 1 1/2 cent per quintal and per week; it runs until February 28, 1942, after which date no further increase is calculated. Thus, the base price per quintal augments as follows:

| | | |
|---|---|---|
| in the week from September 1 to 6, 1941. . . . . . . . . | Florins | 0.30 |
| » » » » » 7 » 13, » . . . . . . . . . . | » | 0.31⁵ |
| » » » » November 23 » 29, » . . . . . . . . . . | » | 0.48 |
| » » » » » 30 » December 6 . . . . . . . | » | 0.19⁵ |
| » » » » February 22 » 28, 1942, and after. . . . . | » | 0.37⁵ |

Consequently, according to the system of calculation adopted by the Institute in calculating monthly averages these prices are as follows

| PERIOD | wheat | rye | winter barley | spring barley | oats |
|---|---|---|---|---|---|
| | florins per quintal | | | | |
| September 1931 | 13 57 | 13 07 | 12 22 | 11 82 | 9 82 |
| October | 13 64 | 13 14 | 12 29 | 11 89 | 9 89 |
| November | 13 71 | 13 21 | 12 36 | 11 96 | 9 96 |
| December | 13 47 | 12 97 | 12 12 | 11 72 | 9 72 |
| January 1932 | 13 54 | 13 04 | 12 19 | 11 79 | 9 79 |
| February | 13 60 | 13 10 | 12 25 | 11 85 | 9 85 |
| March to [illegible] 1932 | 13 62 | 13 12 | 12 27 | 11 87 | 9 87 |

**Rumania.**

An Order of the Under Secretary of Food issued on August 15 1931, establishes prices for rye barley and oats They are for station or harbour of delivery

| | | | |
|---|---|---|---|
| *Rye* specific weight | 68 kg, | 3 % impurities | Lei 900 per quintal, |
| *Barley* | 60 | 4 % | 750 |
| *Oats* | 42 | 4 % | 700 |

The increases and reductions for higher or lower specific weight as well as for every per cent less or more impurities are the same as those for wheat, namely 1 per cent more or less than the base price for each kg higher or lower specific weight than indicated as well as for each per cent less or more impurities than indicated

# PRICES BY PRODUCTS.

## A) — Spot quotations. [1]

| Description | Sept 12, 1941 | Sept. 5, 1941 | August 29, 1941 | August 22, 1941 | August 15, 1941 | Monthly averages: August 1941 | Monthly averages: Sept 1940 | Monthly averages: Sept 1939 | Yearly averages: 1940-41 [2] | Yearly averages: 1939-40 [2] |
|---|---|---|---|---|---|---|---|---|---|---|
| **Wheat** | | | | | | | | | | |
| Chicago. No 2 Hard Winter (cents p 60 lb.) | ... | ... | ... | ... | ... | ... | 80 1/8 | 86 1/8 | 90 3/4 | 92 7/8 |
| Minneapolis (cents per 60 lb): | | | | | | | | | | |
| No. 1 Northern | 113 1/2 | 110 5/8 | 105 | 104 1/8 | 105 1/8 | 104 1/8 | 76 7/8 | 87 [illegible] | 87 1/8 | 91 1/8 |
| No. 2 Amber Durum | 106 1/8 | 104 5/8 | 99 | 96 | 97 1/8 | 96 3/4 | 69 1/2 | 81 3/8 | 79 5/8 | 80 3/4 |
| New York (cents p 60 lb.): | | | | | | | | | | |
| No. 1 Manitoba Northern (c. i. f.) | 90 1/8 | 89 5/8 | 88 3/8 | 90 | 90 3/4 | 89 3/4 | 82 3/4 | *86 | 88 1/4 | 92 1/8 |
| No. 2 Hard Winter (f. o. b.) | 138 | 135 1/2 | 132 1/8 | 133 | 131 3/4 | 130 3/4 | 69 5/8 | 105 [illegible] | 106 1/2 | 112 1/4 |
| Buenos-Aires (a): No. 2 Hard, 78 kg per hl (paper pesos p 100 kg) | 6.85 | 6.95 | 7.07 | 7.05 | 7.05 | 7,05 | 7.58 | 6.86 | 6.92 | 7.66 |
| **Rye.** | | | | | | | | | | |
| Minneapolis No 2 rye (cents p 56 lb.) | 71 | 68 5/8 | 62 1/8 | 61 7/8 | 60 1/4 | 61 1/4 | 51 1/8 | 43 [illegible] | 50 7/8 | 56 1/8 |
| New York No 2 (c. i. f., cents p. 56 lb.) | 94 1/4 | 95 5/8 | 90 1/4 | 90 1/8 | *88 7/8 | 87 3/4 | *61 3/8 | *72 [illegible] | 63 7/8 | 77 5/8 |
| **Barley.** | | | | | | | | | | |
| Chicago: Feeding (on sample; cents p 48 lb) | ... | ... | ... | ... | ... | ... | 42 3/4 | 42 [illegible] | 46 5/8 | 42 1/4 |
| Minneapolis: No 2 Feeding (cents p 48 lb) | n q | n q | n q | n q | n. q | n. q. | 39 1/8 | 42 7/8 | *41 1/4 | 45 |
| New York: No 2 (cents p. 48 lb.) | 81 | 76 3/4 | 69 | 69 | 65 3/4 | 66 3/8 | *61 [illegible] | 65 1/4 | 65 3/8 | 62 5/8 |
| **Oats.** | | | | | | | | | | |
| Chicago: No. 2 White (cents per 32 lb.) | ... | ... | ... | ... | ... | ... | 32 1/4 | 36 | 37 1/4 | 39 |
| Buenos-Aires (a) No 2 White, 49 kg p hl (paper pesos per 100 kg.) | 4 60 | 4.60 | 4.60 | 4 60 | 4.60 | 4 55 | 4 00 | 5 44 | 4.07 | *5.17 |
| **Maize.** | | | | | | | | | | |
| Chicago: No. 3 Yellow (cents p. 56 lb) | ... | ... | ... | ... | ... | ... | 63 7/8 | 55 1/2 | 64 3/8 | 53 1/4 |
| New York: No 2 Mixed Western (cents p. 56 lb.) | 92 7/8 | 91 3/4 | 90 3/4 | 90 1/4 | 91 5/8 | 90 5/8 | 79 11/16 | *71 3/8 | 79 7/8 | 72 3/4 |
| **Linseed.** | | | | | | | | | | |
| Buenos-Aires (a): No. 1; 4 % impurities (paper pesos p 100 kg) | 9.85 | 9.80 | 9.90 | 9.65 | 9.75 | 9.77 | 10.12 | 18 11 | *13.64 | 15.12 |
| London (c.i f., shipping current or following month; £ per long ton): | | | | | | | | | | |
| La Plata | 12-2-6 | 12-2-6 | 12-2-6 | 12-5-0 | 12-5-0 | 12-5-6 | 11-18-1 | n. q. | *14- 2-0 | *12- 2-3 |
| Bombay | 21-5-0 | 21-5-0 | 21-5-0 | 21-5-0 | 21-5-0 | 21-5-0 | 16-15-7 | n. q | 18-11-9 | *14-10-3 |
| Minneapolis: No 1 Northern (cts. p. 56 lb.) | 205 1/4 | 194 1/8 | 190 | 190 | 186 | 189 | 145 7/8 | 176 1/4 | 178 | 180 |
| **Cotton.** | | | | | | | | | | |
| New Orleans: Middling (cents p. lb.) | 17.58 | 17,12 | 16.46 | 16.01 | 15.76 | 16.07 | 9.53 | n. 9.02 | 11.06 | n. 10.03 |
| New York: Middling (cents per lb) | 18.59 | 18.01 | 17 42 | 17.00 | 16 65 | 17.03 | 9.89 | n. 9 33 | 11.55 | n. 10.34 |

* Indicates that the product was not quoted during part of the period under review. — n. q. = *not* — (*a*) Thursday prices.

(1) In relation to Government price fixing, numerous series are omitted from this table; notes concerning them are given on page 413 et seq of the August- and on page 456 et seq. of this issue of the Crop Report — (2) Commercial season: August-July, except for maize: May-April, and for linseed: calendar year.

## B) — Quotations for future delivery.

| Description | Sept 12, 1941 | Sept 5, 1941 | August 29, 1941 | August 22, 1941 | August 15, 1941 | Monthly averages: August 1941 | Sept 1940 | Sept 1939 | Sept 1938 | Sept 1937 |
|---|---|---|---|---|---|---|---|---|---|---|
| **Wheat.** | | | | | | | | | | |
| Winnipeg (cents p. 60 lb.) | | | | | | | | | | |
| delivery October | 73 7/8 | 73 [illegible]/8 | 72 [illegible]/8 | 74 1/2 | 75 1/4 | 74 5/8 | 71 7/8 | 72 3/4 | 62 | 126 3/8 |
| „ December | 75 1/2 | 75 | 74 3/8 | 76 1/8 | 77 | 76 1/8 | 73 1/4 | 74 3/8 | 61 3/4 | 123 1/8 |
| „ May | 79 3/4 | 79 1/8 | 78 [illegible]/8 | 80 1/8 | 81 1/4 | 80 1/2 | 76 | 78 1/8 | 65 1/2 | 124 1/2 |
| Chicago (cents p. 60 lb.) | | | | | | | | | | |
| delivery September | 119 | 117 1/4 | 113 3/8 | 112 1/2 | 112 1/4 | 111 1/4 | 75 7/8 | 83 3/8 | 63 1/8 | 105 |
| „ December | 122 7/8 | 121 3/4 | 117 3/8 | 116 1/4 | 116 1/8 | 114 3/4 | 77 3/4 | 82 3/4 | 64 3/8 | 106 1/4 |
| „ May | 127 1/2 | 125 5/8 | 120 1/4 | 119 1/8 | 119 1/4 | 117 5/8 | 78 1/2 | 83 3/8 | 65 5/8 | 108 1/8 |
| Buenos Aires (paper pesos p. 100 kg.)* | | | | | | | | | | |
| delivery September | — | — | 6.76 | 6.77 | 6.83 | 6.80 | * 7.74 | — | — | * 14.11 |
| „ October | 6.80 | 6.78 | 6.81 | 6.82 | 6.86 | 6.85 | 7.45 | 6.97 | 6.84 | 14.00 |
| „ November | 6.83 | 6.84 | — | — | — | — | * 7.37 | * 7.04 | 6.92 | 13.48 |
| **Rye.** | | | | | | | | | | |
| Winnipeg (cents p. 56 lb.) | | | | | | | | | | |
| delivery October | 63 1/2 | 59 7/8 | 55 1/4 | 55 | 55 3/4 | 55 3/8 | 43 3/8 | 55 [illegible] | 40 | 89 1/2 |
| „ December | 63 1/2 | 60 | 56 1/8 | 56 | 56 3/4 | 56 1/4 | 44 1/2 | 54 3/4 | 40 5/8 | 88 5/8 |
| „ May | 65 1/2 | 62 3/4 | 58 1/2 | 58 3/4 | 59 [illegible]/8 | 59 [illegible]/8 | 46 1/8 | 56 1/2 | 42 3/4 | 89 1/8 |
| Chicago (cents p. 56 lb.) | | | | | | | | | | |
| delivery September | 75 1/4 | 76 5/8 | 68 1/4 | 68 1/8 | 67 7/8 | 67 3/4 | 40 5/8 | 50 3/8 | 41 5/8 | 81 3/8 |
| „ December | 78 1/4 | 77 3/8 | 72 1/8 | 72 1/8 | 71 3/4 | 71 5/8 | 43 3/4 | 52 3/8 | 43 1/8 | 79 1/8 |
| „ May | 84 3/8 | 83 3/8 | 76 3/4 | 76 1/8 | 76 1/8 | 76 | 46 7/8 | 55 1/8 | 44 3/4 | 79 |
| **Barley.** | | | | | | | | | | |
| Winnipeg (cents p. 48 lb.) | | | | | | | | | | |
| delivery October | 59 7/8 | 54 1/8 | 51 1/4 | 51 1/4 | 51 5/8 | 50 3/4 | 35 3/8 | 45 5/8 | 36 | 59 1/4 |
| „ December | 59 | 54 1/4 | 51 1/4 | 51 1/2 | 51 | 50 1/4 | 35 1/8 | 44 3/8 | 35 [illegible]/8 | 56 7/8 |
| „ May | 58 1/2 | 54 3/8 | 51 1/8 | 51 1/2 | 51 3/4 | 51 5/8 | 36 1/2 | 46 | 37 1/2 | 56 5/8 |
| Minneapolis (cents p. 48 lb.) | | | | | | | | | | |
| delivery September | ... | ... | ... | | ... | ... | 36 3/8 | 39 7/8 | 33 | 51 1/4 |
| „ December | ... | ... | ... | ... | ... | ... | 36 1/2 | 41 | 32 7/8 | 45 3/8 |
| **Oats.** | | | | | | | | | | |
| Winnipeg (cents p. 34 lb.): | | | | | | | | | | |
| delivery October | 50 | 49 | 46 5/8 | 46 5/8 | 44 1/8 | 43 1/2 | 30 | 35 7/8 | 29 3/8 | 50 1/4 |
| „ December | 47 3/8 | 46 3/4 | 44 1/2 | 43 7/8 | 41 1/8 | 40 7/8 | 28 1/4 | 34 3/4 | 28 1/8 | 47 5/8 |
| „ May | 46 3/8 | 45 7/8 | 43 3/4 | 43 3/4 | — | * 42 1/2 | 28 7/8 | 35 [illegible]/8 | 29 3/4 | 47 3/8 |
| Chicago (cents p. 32 lb.): | | | | | | | | | | |
| delivery September | 52 1/4 | 49 3/4 | 46 3/8 | 44 1/2 | 41 3/4 | 42 1/8 | 29 7/8 | 35 1/8 | 24 5/8 | 31 1/8 |
| „ December | 53 7/8 | 50 3/4 | 48 1/8 | 48 7/8 | 44 5/8 | 45 1/4 | 30 1/8 | 34 | 25 1/4 | 30 1/2 |
| „ May | 55 3/4 | 53 | 49 3/4 | 48 1/4 | 47 3/4 | 47 | 30 7/8 | 34 1/4 | 26 1/8 | 31 1/2 |

Indicates that the product was not quoted during part of the period under review.

| Description | Sept. 12, 1941 | Sept. 5, 1941 | August 29, 1941 | August 22, 1941 | August 15, 1941 | Monthly averages: August 1941 | Sept. 1940 | Sept. 1939 | Sept. 1938 | Sept. 1937 |
|---|---|---|---|---|---|---|---|---|---|---|
| **Maize.** | | | | | | | | | | |
| Chicago (cents p. 56 lb.): | | | | | | | | | | |
| delivery September | 79 5/8 | 78 1/4 | 77 1/4 | 77 1/4 | 78 1/8 | 77 9/16 | * 62 3/4 | 55 3/4 | 51 7/8 | 106 1/8 |
| „ December | 84 3/4 | 82 1/2 | 81 1/2 | 81 3/8 | 81 5/8 | 81 | 56 7/8 | 53 7/8 | 49 3/4 | 63 1/16 |
| „ May | 90 | 87 1/4 | 85 5/8 | 84 1/8 | 85 7/8 | 84 1/2 | 57 5/8 | 56 5/8 | 51 7/8 | 64 3/8 |
| **Linseed.** | | | | | | | | | | |
| Winnipeg (cents per 56 lb.): | | | | | | | | | | |
| delivery October | 160 1/2 | 146 | 145 1/2 | 147 7/8 | 144 1/2 | 144 1/8 | 133 3/8 | 165 | 136 1/2 | 177 1/16 |
| „ December | 160 1/2 | 146 | 145 1/2 | 147 1/4 | 144 1/8 | 144 1/8 | — | 158 | 135 1/4 | 177 |
| „ May | 161 1/2 | 149 1/4 | 149 1/2 | 149 | 147 1/2 | 148 5/8 | — | — | — | * 179 1/2 |
| Duluth (cents p. 56 lb.): | | | | | | | | | | |
| delivery September | ... | ... | ... | ... | ... | ... | 145 1/4 | — | 173 | 200 |
| Buenos Aires (paper pesos p. 100 kg.): | | | | | | | | | | |
| delivery September | — | — | 9.88 | 9.68 | 10.00 | 9.97 | * 10.05 | — | — | 16.11 |
| „ October | 10.22 | 10.24 | 10.12 | 10.00 | 10.26 | 10.20 | 10.05 | 17.44 | 13.46 | 16.05 |
| „ November | 10.49 | 10.52 | — | — | — | — | * 9.86 | 17.22 | 13.24 | 15.99 |

* Indicates that the product was not quoted during part of the period under review.

## INDEX-NUMBERS OF PRICES OF AGRICULTURAL PRODUCTS AND OF COMMODITIES BOUGHT BY THE FARMER

| DESCRIPTION | July 1941 | June 1941 | May 1941 | April 1941 | March 1941 | Feb 1941 | July 1940 | July 1939 | YEAR 1940 41 (²) | YEAR 1939 40 (²) |
|---|---|---|---|---|---|---|---|---|---|---|
| **Germany** | | | | | | | | | | |
| Statistisches Reichsamt products sold by farmers) Average for corresponding months 1909 10 1913 14 = 100 | | | | | | | | | | |
| Cereals | 102 | 111 | 110 | 113 | 114 | 113 | 101 | 101 | 111 | 111 |
| Edible potatoes | 173 | 115 | 120 | 116 | 114 | 106 | 147 | 141 | 118 | 115 |
| *Plant products* | 131 | 112 | 113 | 114 | 114 | 113 | 120 | 118 | 113 | 112 |
| Meat animals | 106 | 107 | 106 | 101 | 99 | 99 | 100 | 98 | 99 | 98 |
| Livestock products (butter and eggs) | 137 | 142 | 137 | 130 | 120 | 120 | 137 | 122 | 126 | 118 |
| *Livestock and livestock products* | 116 | 119 | 116 | 110 | 106 | 106 | 112 | 106 | 107 | 104 |
| *Total agricultural products* | 119 | 118 | 116 | 111 | 108 | 107 | 113 | 108 | 109 | 106 |
| **Germany** | | | | | | | | | 1940 | 1939 |
| (Statistisches Reichsamt wholesale products) 1913 = 100 | | | | | | | | | | |
| Agricultural products | 113 5 | 114 0 | 112 9 | 111 8 | 111 3 | 110 9 | 112 5 | 108 7 | 110 7 | 107 9 |
| Fertilizers | 51 0 | 49 0 | 53 7 | 56 1 | 56 1 | 56 1 | 50 1 | 52 0 | 53 1 | 54 6 |
| Consumption goods (¹) | 146 5 | 146 6 | 146 9 | 147 3 | 147 4 | 147 3 | 142 9 | 135 8 | 141 6 | 135 9 |
| *Wholesale products in general* | 112 4 | 112 4 | 112 2 | 111 9 | 111 7 | 111 6 | 110 7 | 107 0 | 110 0 | 106 9 |
| **Argentina** | | | | | | | | | | |
| Banco Central de la Republica Argentina) 1926 = 100 | | | | | | | | | | |
| Cereals and linseed | 60 5 | 59 9 | 59 7 | 59 7 | 59 8 | 59 8 | 72 9 | 73 4 | 68 8 | 77 6 |
| Meat | 106 9 | 102 4 | 101 6 | 103 3 | 99 6 | 94 1 | 105 9 | 94 9 | 102 9 | 94 5 |
| Hides and skins | 97 0 | 100 8 | 104 1 | 97 8 | 99 6 | 94 4 | 68 4 | 79 6 | 92 1 | 89 2 |
| Wool | 110 5 | 117 6 | 106 1 | 101 0 | 99 6 | 99 6 | 93 1 | 97 3 | 116 6 | 103 9 |
| Dairy products | 111 1 | 102 5 | 90 6 | 81 4 | 76 0 | 75 2 | 89 3 | 83 9 | 82 0 | 83 0 |
| Forest products | 121 5 | 121 5 | 121 5 | 121 5 | 118 7 | 118 7 | 111 6 | 101 5 | 112 8 | 104 2 |
| *Total agricultural products* | 76 4 | 76 2 | 75 0 | 73 9 | 73 3 | 72 2 | 80 0 | 79 4 | 80 4 | 83 6 |
| *Non-agricultural commodities* | 163 6 | 155 8 | 150 0 | 146 4 | 141 7 | 139 6 | 136 5 | 109 4 | 135 4 | 114 8 |
| *Wholesale products in general* | 144 9 | 138 7 | 133 9 | 130 9 | 127 1 | 125 2 | 124 5 | 103 0 | 123 4 | 108 2 |
| **Chili** | | | | | | | | | | |
| Dirección General de Estadistica) 1913 = 100 | | | | | | | | | | |
| Cereals | | | 522 8 | | | | 477 4 | 438 8 | 474 4 | 441 1 |
| Other plant products | | | 614 3 | | | | 521 1 | 432 1 | 506 8 | 396 9 |
| Meat animals | | | 397 3 | | | | 429 5 | 376 0 | 414 1 | 366 1 |
| Wheat | | | 354 7 | | . | | 395 9 | 280 6 | 376 7 | 303 4 |
| *Total agricultural products* | .. | | 539 8 | | . | | 486 6 | 426 6 | 475 0 | 400 7 |
| *Domestic industrial products* | | | 489 0 | . | . | | 490 6 | 434 1 | 473 4 | 433 6 |
| *Wholesale products in general* | . | | 609 9 | . | . | | 563 8 | 500 1 | 553 7 | 496 7 |

(¹) Household goods of all kinds, and clothing. — (²) Agricultural year: July 1 June 30

| Description | July 1941 | June 1941 | May 1941 | April 1941 | March 1941 | Feb. 1941 | July 1940 | July 1939 | Year 1940 | Year 1939 |
|---|---|---|---|---|---|---|---|---|---|---|
| **Denmark** | | | | | | | | | | |
| (Det landökonomiske Driftsbureau) Average 1909 to 1914 = 100 | | | | | | | | | | |
| Cereals | ... | 207 | 207 | 207 | 207 | 207 | 162 | 109 | 179 | 118 |
| Total plant products (1) | ... | 246 | 246 | 246 | 243 | 243 | 203 | 108 | 210 | 121 |
| Dairy products | ... | 221 | 221 | 221 | 220 | 216 | 158 | 114 | 156 | 119 |
| Total animal products (1) | ... | 221 | 216 | 218 | 214 | 213 | 155 | 126 | 161 | 131 |
| *Total agricultural products* | ... | 222 | 218 | 220 | 216 | 215 | 158 | 125 | 165 | 130 |
| Fertilizers | ... | 169 | 169 | 169 | 173 | 170 | 124 | 100 | 134 | 100 |
| Concentrated feedingstuffs | ... | — | — | — | — | — | 179 | 114 | 187 | 132 |
| Seeds | ... | 238 | 238 | 238 | 238 | 238 | 141 | 96 | 141 | 96 |
| *Total products purchased* | ... | 204 | 204 | 204 | 205 | 204 | 164 | 110 | 171 | 122 |
| **United States** | | | | | | | | | | |
| (Bureau of Agricultural Economics) Average 1909-10 to 1913-14 = 100. | | | | | | | | | | |
| A: Uncorrected for seasonal variation | | | | | | | | | | |
| Cereals | 98 | 96 | 93 | 90 | 84 | 81 | 78 | 66 | 85 | 72 |
| Cotton and cottonseed | 121 | 107 | 98 | 88 | 82 | 80 | 80 | 73 | 81 | 73 |
| Fruits | 93 | 97 | 89 | 89 | 83 | 80 | 89 | 80 | 79 | 77 |
| Meat animals | 154 | 144 | 138 | 137 | 129 | 130 | 110 | 107 | 107 | 110 |
| Dairy products | 132 | 126 | 124 | 121 | 118 | 118 | 105 | 96 | 113 | 104 |
| Chickens and eggs | 127 | 118 | 107 | 104 | 90 | 90 | 88 | 89 | 96 | 94 |
| Miscellaneous | 107 | 98 | 93 | 94 | 91 | 93 | 98 | 89 | 101 | 93 |
| *Total agricultural products* | (3) 125 | 118 | 112 | 110 | 103 | 103 | 95 | 89 | 98 | 92 |
| Commodities bought for use in living and production | 129 | 126 | 125 | 124 | 123 | 123 | 122 | 120 | 122 | 121 |
| *Prices, interest and taxes paid by farmers* | 133 | 130 | 130 | 129 | 128 | 128 | 127 | 126 | 127 | 127 |
| *Agricultural wages* (2) | 160 | — | — | 138 | — | — | 129 | 126 | 124 | 122 |
| B: Corrected for seasonal variation | | | | | | | | | | |
| Cereals | 97 | 92 | 91 | 89 | 82 | 80 | 77 | 66 | — | — |
| Cotton and cottonseed | 117 | 104 | 95 | 87 | 83 | 82 | 77 | 71 | — | — |
| Fruits | 84 | 80 | 79 | 86 | 83 | 84 | 81 | 72 | — | — |
| Truck crops (market garden crops) | 130 | 146 | 146 | 161 | 134 | 156 | 98 | 101 | — | — |
| Meat animals | 150 | 142 | 135 | 133 | 125 | 131 | 107 | 105 | — | — |
| Dairy products | 139 | 132 | 128 | 121 | 116 | 115 | 110 | 100 | — | — |
| Chickens and eggs | (4) 135 | 136 | 121 | 121 | 105 | 97 | 103 | 104 | — | — |
| Miscellaneous | 102 | 95 | 91 | 94 | 96 | 98 | 93 | 85 | — | — |
| *Total agricultural products* | 123 | 117 | 112 | 110 | 103 | 104 | 95 | 88 | — | — |
| *Agricultural wages* (2) | 155 | — | — | 141 | — | — | 125 | 122 | — | — |
| **United States** | | | | | | | | | | |
| (Bureau of Labor) 1926 = 100. | | | | | | | | | | |
| Grains | 76.3 | 75.9 | 74.5 | 70.9 | 67.8 | 64.5 | 60.8 | 52.3 | 67.9 | 58.7 |
| Livestock and poultry | 98.9 | 93.0 | 88.0 | 86.2 | 82.5 | 82.4 | 69.8 | 69.7 | 69.1 | 72.2 |
| Other farm products | 79.9 | 76.6 | 69.5 | 67.8 | 65.6 | 64.2 | 65.6 | 60.7 | 66.2 | 62.6 |
| *Total agricultural products* | (5) 85.8 | 82.1 | 76.4 | 74.4 | 71.6 | 70.3 | 66.5 | 62.6 | 67.6 | 65.4 |
| Agricultural implements | 92.5 | 92.4 | 92.4 | 92.3 | 92.7 | 92.8 | 92.4 | 93.4 | 92.8 | 93.4 |
| Fertilizer materials | 74.0 | 69.9 | 71.1 | 77.1 | 70.4 | 70.4 | 67.3 | 67.5 | 69.4 | 70.4 |
| Mixed fertilizers | 77.0 | 73.8 | 73.2 | 73.2 | 73.7 | 73.8 | 72.8 | 72.6 | 73.8 | 73.0 |
| Cattle feed | 104.2 | 88.9 | 81.8 | 85.2 | 82.7 | 81.2 | 83.2 | 72.4 | 87.6 | 82.0 |
| *Non-agricultural commodities* | 89.3 | 88.0 | 86.6 | 85.0 | 83.6 | 82.7 | 80.0 | 78.1 | 80.8 | 79.6 |
| *Wholesale products in general* | (6) 88.8 | 87.1 | 84.9 | 82.0 | 81.5 | 80.6 | 77.7 | 75.4 | 78.5 | 77.2 |

(1) Including unspecified products. — (2) 1910-1914 = 100. — (3) August: 131. — (4) August: 132. — (5) August: 87.4. — (6) August 90.3

| Description | July 1941 | June 1941 | May 1941 | April 1941 | March 1941 | Feb. 1941 | July 1940 | July 1939 | Year 1940 | Year 1939 |
|---|---|---|---|---|---|---|---|---|---|---|
| **Hungary** | | | | | | | | | | |
| (Central Royal Bureau of Statistics) 1929 = 00. | | | | | | | | | | |
| Cereals | 130.5 | 105.6 | 105.6 | 105.5 | 105.5 | 104.9 | 98 9 | 83.9 | 96.2 | 85.9 |
| Total raw plant products (¹) | 129.0 | 113 6 | 114.6 | 116.6 | 115.7 | 114.8 | 106.3 | 78.8 | 101.9 | 79.5 |
| Meat animals, meat and lard | 129.7 | 126.4 | 124.8 | 120.2 | 104.3 | 102 1 | 88.4 | 64.9 | 87.1 | 65.1 |
| Total livestock products (¹) | 120 8 | 112 9 | 112 4 | 109.9 | 100.3 | 96.8 | 84.3 | 64 6 | 85.1 | 65.6 |
| *Total agricultural products* | 126 4 | 113 4 | 113 4 | 114.5 | 110.9 | 109.2 | 99 4 | 74.3 | 96.7 | 75.2 |
| *Products of agricultural industries* | 138.2 | 108.5 | 107.9 | 107.9 | 107.9 | 107.7 | 99.0 | 91.5 | 101 0 | 93.9 |
| *Industrial raw materials and products.* | 120.4 | 118 6 | 117 3 | 115.4 | 114.3 | 112.9 | 103.9 | 92.4 | 102.3 | 93.1 |
| *Wholesale products in general.* | 125.3 | 115 9 | 115.4 | 114.7 | 112.7 | 111.2 | 101.9 | 85.3 | 100.3 | 86.3 |
| **Norway** | | | | | | | | | 1940-41 (²) | 1939-40 (²) |
| (Landbrukshoiskole) Average 1909 to 1914 = 100 | | | | | | | | | | |
| Plant products | . | 226 | 226 | 226 | 226 | 221 | 276 | 146 | 229 | 168 |
| Pork | | 231 | 213 | 205 | 205 | 183 | 162 | 140 | 172 | 144 |
| Other meat | | 270 | 270 | 270 | 270 | 249 | 209 | 175 | 226 | 172 |
| Dairy products | . | 246 | 241 | 235 | 236 | 237 | 195 | 163 | 215 | 173 |
| Eggs | .. | 206 | 196 | 185 | 185 | 185 | 185 | 101 | 161 | 122 |
| Livestock products | . | 245 | 238 | 232 | 233 | 227 | 223 | 166 | 206 | 165 |
| *Total agricultural products* | ... | 241 | 235 | 231 | 232 | 225 | 221 | 170 | 211 | 166 |
| Superphosphate, 16 % | .. | 184 | 184 | 184 | 184 | 184 | .. | . | 192 | 141 |
| Potash salt, 40 % | ... | 118 | 118 | 118 | 118 | 118 | ... | .. | 117 | 109 |
| Nitrate of lime, 15 ½ % | .. | 83 | 83 | 83 | 81 | 81 | .. | .. | 82 | 78 |
| Feedingstuffs for milk production | ... | 246 | 246 | 246 | 246 | 246 | 203 | 160 | 227 | 167 |
| Feedingstuffs for pork production | .. | — | — | — | — | — | — | 149 | — | 157 |
| Building materials | ... | 233 | 229 | 224 | 224 | 224 | 201 | 174 | 210 | 183 |
| Machinery and implements | . | 302 | 302 | .. | 261 | 261 | 235 | 210 | 250 | 219 |
| Total production goods bought | . | ... | .. | ... | 228 | 228 | 198 | 164 | 214 | 174 |
| Consumption goods bought | .. | 272 | 267 | 265 | 264 | 257 | 209 | — | 232 | 184 |
| *Total goods for production and consumption bought* | ... | ... | ... | ... | 243 | 240 | 203 | 168 | 222 | 178 |
| *Agricultural wages.* | .. | ... | ... | .. | 238 | 230 | — | 215 | 238 | 215 |
| **Norway** | | | | | | | | | | |
| (Kgl. Selskap for Norges Vel) Average 1909-1914 = 100. | | | | | | | | | | |
| Cereals | 213 | 213 | 213 | 213 | 213 | 213 | 175 | 163 | 195 | 168 |
| Potatoes | 250 | 250 | 250 | 250 | 250 | 235 | 454 | 152 | 282 | 186 |
| Pork | 248 | 247 | 230 | 218 | 218 | 204 | 163 | 131 | 177 | 141 |
| Other meat | 265 | 265 | 265 | 265 | 265 | 246 | 203 | 169 | 217 | 168 |
| Dairy products | 219 | 219 | 219 | 219 | 219 | 219 | 198 | 179 | 208 | 186 |
| Eggs | 217 | 217 | 206 | 195 | 195 | 195 | 147 | 109 | 169 | 129 |
| Concentrated feedingstuffs | 214 | 214 | 214 | 214 | 214 | 214 | 203 | 155 | 205 | 163 |
| Maize | — | — | — | — | — | — | — | 157 | 194 | 165 |
| Fertilizers | 123 | 123 | 165 | 123 | 122 | 122 | 124 | 94 | 127 | 101 |

(¹) Including unspecified products. — (²) Agricultural year: April 1 to March 31.

| Description | July 1941 | June 1941 | May 1941 | April 1941 | March 1941 | Feb. 1941 | July 1940 | July 1939 | Year 1940-41 (1) | Year 1939-40 (1) |
|---|---|---|---|---|---|---|---|---|---|---|
| **Netherlands** | | | | | | | | | | |
| (Bureau of Agriculture) Average 1924-25 to 1928-29 = 100. | | | | | | | | | | |
| Plant products | 87 | 86 | 83 | 82 | 80 | 80 | 73 | 54 | 79 | 69 |
| Livestock products | 106 | 102 | 104 | 104 | 96 | 89 | 79 | 63 | 89 | 71 |
| *Total agricultural products* | 102 | 98 | 100 | 99 | 93 | 87 | 78 | 61 | 87 | 70 |
| *Agricultural wages* | . | 86 | 86 | 86 | 86 | 86 | 86 | 75 | 86 | 77 |
| **Switzerland** | | | | | | | | | 1940 | 1939 |
| (Schweizerischer Bauernverband) 1914 = 100. | | | | | | | | | | |
| Slaughter cattle | 164 | 161 | 163 | 156 | 134 | 132 | 128 | 114 | 128 | 115 |
| Slaughter pigs | 221 | 222 | 205 | 194 | 194 | 194 | 141 | 120 | 154 | 129 |
| Milk (base price) | 147 | 147 | 147 | 147 | 147 | 147 | 135 | 121 | 135 | 122 |
| *Total agricultural products* | (3) 172 | 170 | 166 | 163 | 158 | 157 | 139 | 118 | 144 | 126 |
| Feedingstuffs (2) | 203 | 202 | 190 | 188 | 183 | 182 | 142 | 103 | 146 | 113 |
| Fertilizers (2) | 129 | 126 | 126 | 126 | 126 | 126 | 112 | 97 | 113 | 101 |
| *Wholesale products in general* (2) | 187.5 | 184.4 | 181.1 | 175.0 | 170.2 | 167.9 | 140.6 | 106.5 | 143.0 | 111.2 |

(1) Agricultural year: July 1 to June 30. — (2) Index numbers calculated by the Bundesamt für Industrie, Gewerbe und Arbeit; base July 1914. — (3) August. 174.

Prof. Ugo Papi, *Segretario generale dell'Istituto, Direttore responsabile.*

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AGRICULTURAL SCIENCE AND PRACTICE

# MONTHLY CROP REPORT
# AND AGRICULTURAL STATISTICS

*The following explanations refer to crop conditions printed in the crop notes and in the tables. — Crop condition according to the system of the country: Germany, Bohemia and Moravia (Protectorate), Hungary: 1 = excellent, 2 = good, 3 = average, 4 [illegible]; Finland: 8 = very good, 6 = above the average, 5 = average; France: 100 = excellent, [illegible] good, 60 = fairly good, 50 = average, 30 = poor; Romania and Sweden: 5 = excellent, 4 = good, 3 = average, 2 = poor, 1 = very poor; Netherlands: 90 = excellent, 70 = good, 60 = fairly good, [illegible] below average; Portugal: 100 = excellent, 80 = good, 60 = average, 40 = poor, [illegible] very poor; Switzerland: 100 = excellent, 90 = very good, 75 = good, 60 = fairly good, 50 = average, 40 = rather poor, 30 = poor, 10 = very poor; U.S.S.R.: 5 [illegible], 4 = above the average, [illegible] below average, 1 = poor; Canada: 100 = crop condition promising a yield [illegible] of years; United States: 100 = crop condition which promises [illegible] crop condition which promises a yield equal to the [illegible]. International [illegible]*

*Note: The countries are listed [illegible] U.S.S.R., [illegible] In the tables [illegible] Northern Hemisphere [illegible]*

***See latest information at page 491.***

## *VEGETAL PRODUCTION*

### CURRENT INFORMATION FROM VARIOUS COUNTRIES ON WHEAT, RYE, BARLEY AND OATS.

*[illegible]*: The harvesting of cereals was nearly over by the beginning of September and was done under good conditions.

*Denmark*: According to the most recent estimate the area cultivated to meslin this year is about [illegible] acres against [illegible] in 1940 and [illegible] on the average of the five years ending 1935 [illegible].

*Finland*: According to the most recent estimate area cultivated to meslin this year will be about 20 000 acres against 24 500 in 1940; percentage 80.2. The corresponding production is estimated at about [illegible] centals (411 000 short tons) against 270 000 (451 000); percentage 85.4 per cent.

*France*: According to unofficial press reports this year wheat production corresponds to a good average one.

*Hungary*: During the three weeks from the [illegible] to the thirtieth of September, the weather was quite favourable to the storing of cereals.

The preparation of the soil for the sowing of cereals was hampered by drought and also, in part, by the scarcity of draft animals. In spite of these difficulties, the sowing of winter barley had been completed by the beginning of October. A good part of winter rye had also been sown by that time. Rain was needed for the young plants. The sowing of winter wheat had been started except on land devoted to late maturing maize.

## *Area and Production of Cereals*

| COUNTRIES | AREA 1941 | AREA 1940 | AREA Aver. 1935 to 1939 | % 1941 1940 = 100 | % 1941 Aver. = 100 | PRODUCTION 1941 | PRODUCTION 1940 | PRODUCTION Aver. 1935 to 1939 | PRODUCTION 1941 | PRODUCTION 1940 | PRODUCTION Aver. 1935 to 1939 | % 1941 1940 = 100 | % 1941 Aver. = 100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 000 acres | | | | | 000 centals | | | 000 bushels | | | | |
| **WHEAT** | | | | | | | | | | | | | |
| Belgium | 439 | (a) 35 | 594 | — | 111 4 | | | 9 691 | . | | 16 151 | | |
| Denmark | 205 | 199 | 316 | 101 8 | 64 1 | | 4 094 | 8 617 | | 6,825 | 14 361 | | |
| Spain | 9 445 | 8 735 | (1)8 [illegible]39 | 108 1 | 109 3 | [illegible]5 377 | 47 648 | 63 270 | 108 959 | 79 412 | (1)105 448 | 137 2 | 103 3 |
| Finland | 326 | 324 | 264 | 100 [illegible] | 1[illegible]5 6 | [illegible] | 3 939 | 4 208 | 6 224 | 6 565 | [illegible] 013 | 94 8 | 88 8 |
| Ireland | 491 | 305 | 225 | 160 9 | 218 4 | | 7 011 | 4 613 | | 11 685 | 7 689 | | |
| Italy | | 12 566 | [illegible] | | | 157 6[illegible]1 | 15[illegible] 754 | 1[illegible]7 713 | 2[illegible]2 713 | 261 251 | 279 517 | 100 6 | 94 0 |
| Rumania | (2)5 807 | (2)5 014 | 9 054 | 115 8 | — | (2)54 124 | (2)30 225 | 84 491 | (2)90 204 | (2)50 375 | 140 816 | 179 1 | — |
| Slovakia | 550 | 535 | (3) 539 | 10[illegible] | 10[illegible] | 6 955 | 6 740 | (3) 8 572 | 11 591 | 11 233 | (3)14 287 | 103 2 | 81 1 |
| Sweden | 707 | 763 | 741 | 9[illegible] | 95 4 | 7 496 | 9 522 | 15 811 | 12 495 | 15 869 | 26 351 | 78 7 | 47 4 |
| Canada | 22 372 | 28 7[illegible] | 25 [illegible] | 77 9 | 87 4 | 183 875 | 330 834 | 187 440 | 30[illegible] 459 | 551 390 | 312 399 | 55 6 | 98 1 |
| Un. St. (w) | 40 316 | 36 147 | 41 186 | 111 5 | 97 9 | 410 980 | 353 491 | 351 [illegible]7 | 684 96[illegible] | 589 1[illegible]1 | 585 776 | 116 3 | 116 9 |
| Un. St. (s) | 16 467 | 17 356 | 1[illegible] 587 | 94 9 | 100 5 | 1[illegible] 757 | 13[illegible] | 105 964 | 276 228 | 227 547 | 176 60[illegible] | [illegible] | [illegible] |
| Mexico | 1 347 | 1 450 | 1 251 | 92 9 | 107 6 | 8 257 | 8 002 | 7 591 | 13 828 | 13 337 | 12 518 | 103 7 | 112 3 |
| India | 34 499 | 33 675 | 34 2[illegible]2 | 102 5 | 100 7 | 223 30[illegible] | [illegible]8 358 | 220 922 | 37[illegible] 176 | 397 [illegible] | 368 [illegible] | [illegible] | 101 1 |
| Japan | 1 983 | 2 024 | 1 738 | 98 1 | 114 1 | [illegible] | 59 68[illegible] | 50 078 | 55 9[illegible]0 | [illegible] | 50 130 | [illegible] | 107 6 |
| Syria and Leb. | 1 600 | | 1 363 | | 117 4 | 16 560 | 14 760 | 11 [illegible] | 27 600 | 24 600 | 19 [illegible] | 112 2 | 141 6 |
| Algeria | | | 4 17[illegible] | | | 19 200 | 16 560 | [illegible]0 890 | 32 000 | 7 600 | 34 81[illegible] | [illegible] | 91 |
| Egypt | 1 561 | 1 565 | 1 4[illegible]4 | 99 9 | 10[illegible] 7 | 24 918 | 29 997 | 27 510 | 41 529 | 49 994 | 45 848 | 83 1 | 90 |
| Tunisia | 1 372 | 1 359 | 1 884 | [illegible] | 70 2 | 8 819 | [illegible] 39 | 9 019 | 14 697 | 10 655 | 15 0[illegible]1 | 137 9 | 97 |
| Argentina | (4)17 915 | (4)17 [illegible]9 | (4)18 [illegible]77 | 102 0 | 9[illegible] 4 | | 162 70[illegible] | [illegible]1 710 | | 271 171 | 19[illegible]1 | | |
| Uruguay | 1 043 | 9[illegible]4 | 1 [illegible]28 | 112 8 | 84 9 | | 4 235 | 7 9[illegible]4 | | 7 058 | 1 25[illegible] | | |
| New Zealand | [illegible]00 | 240 | [illegible] | 1[illegible] | 1[illegible] | [illegible] 000 | 5 040 | [illegible]77 | 10 000 | 8 400 | [illegible] | [illegible] | [illegible] |
| **RYE** | | | | | | | | | | | | | |
| Belgium | 310 | 280 | 509 | 110 7 | 64 1 | | | 7 790 | | | 13 91[illegible] | | |
| Denmark | 474 | [illegible] | [illegible] | 1[illegible]9 | 1[illegible]7 | | 908 | [illegible] | | 10 [illegible]1 | [illegible]9 91 | | |
| Spain | 1 475 | 1 361 | (1)1 30[illegible] | 108 [illegible] | 113 1 | 3 754 | 7 740 | (1) 9 041 | [illegible] | 1[illegible]821 | (1)1[illegible] 144 | 113 1 | 96 6 |
| Finland | 175 | 459 | 578 | 10[illegible] | 81 7 | 5 997 | 4 627 | 7 774 | 10 708 | 8 [illegible]3 | 13 88[illegible] | 12[illegible]6 | 77 1 |
| Slovakia | 372 | 368 | (3) 580 | 101 1 | 97 8 | 4 40[illegible] | 4 40[illegible] | (3) 5 [illegible]59 | 7 874 | 7 862 | (3) 9 391 | 100 [illegible] | 83 8 |
| Sweden | 509 | 47[illegible] | 495 | 1[illegible]0 | 102 8 | 6 1[illegible] | [illegible] 775 | 8 304 | 11 063 | 11 705 | 14 828 | 98 7 | 74 6 |
| Canada | 1 077 | 1 0[illegible] | 81[illegible] | 101 1 | 131 9 | 7 785 | 7 837 | 5 147 | 13 902 | 1[illegible] 994 | 9 191 | 99 3 | 151 3 |
| United States | 3 436 | 3 19[illegible] | [illegible]7[illegible] | 107 [illegible] | 92 3 | 26 019 | 22 [illegible]37 | 25 576 | 46 462 | 40 [illegible]01 | 45 672 | 114 4 | 101 7 |
| Argentina | (4)2 385 | (4)2 7[illegible]1 | (4)[illegible] 480 | 8[illegible] 7 | 96 2 | | 4 678 | 5 [illegible]86 | | 8 [illegible] | 9 974 | | |
| **BARLEY** | | | | | | | | | | | | | |
| Belgium | 74 | 57 | 7[illegible] | 130 4 | 98 0 | | | 1 757 | | | [illegible]61 | | |
| Denmark | 950 | [illegible]5[illegible] | 9[illegible] | 97 2 | 99 0 | | [illegible]5 104 | [illegible]5 191 | | 52 301 | 5[illegible] 485 | | |
| Spain | 3 886 | 3 859 | (1)3 38[illegible] | 100 7 | 11[illegible]9 | 37 146 | 30 769 | [illegible]1 262 | 77 390 | 64 103 | [illegible]5 1[illegible]0 | 120 7 | 118 8 |
| Finland | 325 | 281 | [illegible]0[illegible] | 11[illegible] | 106 [illegible] | [illegible]219 | [illegible] | 4 070 | 6 706 | 6 377 | 8 478 | 105 2 | 79 1 |
| Ireland | 169 | 132 | 118 | 128 0 | 142 9 | | 3 114 | 2 598 | | 6 487 | 5 [illegible]13 | | |
| Slovakia | 489 | 497 | (3) 492 | 98 5 | 99 5 | 5 84[illegible] | 6 719 | (3) 6 946 | 12 172 | 13 999 | (3)14 470 | 86 9 | 84 1 |
| Canada | 5 449 | 4 341 | 4 291 | 125 5 | 127 0 | 58 2[illegible]1 | 50 043 | 42 663 | 121,378 | 104 256 | 88 882 | 116 4 | 136 6 |
| United States | 13 977 | 13 394 | 10 774 | 104 4 | 129 7 | 168 7[illegible]1 | 148 433 | 113 409 | 351 522 | 309 235 | 236 270 | 113 7 | 148 8 |
| Japan | | 1 848 | 1 892 | . | | 56 385 | 37 198 | 35 112 | 75,803 | 77 498 | 73 152 | 97 8 | 103 6 |
| Algeria | | | 3 058 | | | 15 360 | 7 920 | 15 415 | 32 000 | 16 500 | 32 114 | 193 9 | 99 6 |
| Egypt | 255 | 268 | 278 | 95 1 | 95 1 | 4 699 | 5 315 | 7 339 | 9,789 | 11 073 | 15,290 | 88 4 | 64 0 |
| Tunisia | | | 1,174 | | | 4 400 | 2 000 | 4,564 | 9,186 | 4 134 | 9 508 | 222 2 | 96,6 |
| Argentina | (4)1,972 | (4)2,139 | (4)1,901 | 92 2 | 103 7 | . | 17,395 | 11 329 | | 36 239 | 23,602 | . . | .. |
| Uruguay | 67 | 54 | (5) 36 | 122 7 | — | . | 216 | (5) 259 | . | 450 | (5) 539 | . | ... |
| New Zealand | 30 | 26 | 24 | 115 4 | 125 5 | 550 | 481 | 461 | 1 146 | 1,002 | 961 | 114 4 | 119.2 |

## *Area and Production of Cereals*

| COUNTRIES | AREA 1941 | 1940 | Average 1935 to 1939 | 1941 % 1940 | 1941 % Aver. = 100 | PRODUCTION 1941 | 1940 | Average 1935 to 1939 | 1941 | 1940 | Average 1935 to 1939 | 1941 % 1940 = 100 | 1941 % Aver. = 100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | [illegible] | | | | | [illegible] | | | 1000 bushels | | | | |
| **OATS** | | | | | | | | | | | | | |
| Belgium | 413 | | 548 | | 75.4 | | | 14 074 | | | 43 982 | | |
| Denmark | 846 | 843 | 926 | 100.3 | 91.4 | | 19 641 | 22 303 | | 61 378 | 69 697 | | |
| Spain | 1 646 | 1 597 | (1) 1 423 | 105.1 | 115.7 | 12 469 | 10 459 | (1) 10 549 | 38 964 | 32 685 | (1) 32 966 | 119.2 | 118.2 |
| Finland | 1 052 | 1 054 | 1 142 | 99.8 | 92.1 | 12 103 | 11 128 | 15 974 | 37 8[illegible] | 34 776 | 49 917 | 108.8 | 75.8 |
| Ireland | 776 | 681 | 571 | 114.0 | 136.0 | | 16 222 | 12 565 | | 50 694 | 39 265 | | |
| Slovakia | 370 | 365 | (2) 333 | 101.5 | 131.3 | | 4 596 | (2) 3 660 | | 14 363 | (2) 11 437 | | |
| Canada | 13 841 | 12 298 | 13 246 | 112.6 | 104.5 | 121 705 | 129 379 | 114 944 | 380 327 | 404 309 | 359 201 | 94.1 | 105.9 |
| United States | 37 236 | 34 847 | 35 417 | 106.9 | 105.1 | 364 130 | 395 401 | 329 369 | 1 138 843 | 1 235 628 | 1 029 279 | 92.2 | 110.6 |
| Algeria | | | 470 | | | 2 560 | | 3 387 | 8 000 | | 10 585 | | 75.6 |
| Argentina | (4) 3 519 | (4) 3 899 | (4) 3 547 | 90.2 | 99 | | 11 894 | 16 254 | | 37 168 | 50 795 | | |
| Uruguay | 237 | 225 | 213 | 105.3 | 111.2 | | 421 | 992 | | 1 316 | 3 100 | | |
| New Zealand | 60 | 61 | 63 | 98.4 | 95.4 | 1 080 | 1 120 | 1 174 | 3 375 | 3 500 | 3 669 | 96.4 | 92.0 |

(a) Winter crop. — (b) Spring crop. — (1) Year 1939. — (2) Not including territories transferred in 1940.
(3) Average of two years. — (4) Areas sown. — (c) Not including barley for brewers.

*Romania.* — During the second half of September the weather was rather fresh and rainy. However ploughing continued in earnest as far as was possible considering the scarcity of farm labour and draught animals. Towards the end of September sowings of winter cereals were going on in full. The Government ordered the organization of the "Sowing week" from 20th September to the 5th October in order to intensify sowing operations to a maximum. Towards the middle of October the condition of wheat sowings both as regards area and seeds was considered more satisfactory than that at the same time in the last two years. During the present season Government help to farmers is given chiefly by facilitating the purchase of necessary seeds of good quality. The Government has made obligatory the treatment of wheat before sowing with copper sulphate or other chemical agents, authorized by the Ministry of Agriculture when declaring the bunt of wheat (Tilletia tritici) an infectious and dangerous malady.

*Argentina.* — Owing to frosts and drought in September wheat was seriously damaged in the provinces of Santa Fe, Cordoba and Santiago del Estero. For the whole of the country however the situation was considered good.

*United States.* — During the last week in September dry weather prevailed in the west; in the north west frosts were frequent; there were tropical storms all around the Gulf of Mexico, but in the interior weather conditions remained favourable to agricultural work. Sowings of winter cereals were late in the East but good progress is reported everywhere else.

During the first week in October in the eastern part of the country rains fell here and there after a long drought, but in the central regions rains were too heavy and in the west plains it snowed and froze. Weather conditions were generally unfavourable to threshing of small grains.

Rains improved superficially the condition of the land in the north east during the week ending October 15, while drought persisted in mid-Atlantic States. In the

interior however the weather improved and in the west it was exceptionally favourable to agricultural work. Sowings of early wheat made good progress. Excessive humidity retarded late sowings.

During the third week of the month drought which was still prevailing in the east and excessive humidity prevailing in the interior retarded agricultural works especially sowing of winter cereals.

According to the October Report area cultivated to spring wheat (durum) is 2 640,000 acres against 3 121 000 in 1940 and 2 636 000 on the average of the preceding 5 year period: percentages 84.6 and 100.1. The corresponding production is estimated at about 26 694 000 centals (44 490 000 bushels) against 20 866 000 (34 776 000) and 16 136 000 (26 894 000): percentages 127.9 and 165.4.

## CURRENT INFORMATION ON MAIZE.

*Bulgaria.* At the beginning of September the forecast for maize production was very optimistic.

The Council of Ministers has decreed that the whole 1941 production of maize and all surpluses of last year are put under the direct control of the State from September 24 of this year. All producers must deliver their maize production to the "Direction Générale pour les achats et l'exportation des céréales". The price fixed for deliveries is 4 levas per kilogram.

*Hungary.* At the beginning of October the harvesting of early varieties of maize and of late varieties ("dent de cheval") sown early had been started. Warm weather particularly in the eastern and northeastern regions was needed for the ripening of late sown and late varieties.

*Romania.* Owing to bad weather in the Spring and the scarcity of labour maize was sown with some delay. The generally fresh and rather rainy weather of summer helped the growth of the crop. During the second half of the month of September the condition of the crop allowed a first estimate of an average production of 11 centals (20 bushels) per acre all over the country. At that time maize was near maturation in the valley of the Danube. In Moldavia the crop was late and the Government took the necessary measures to prevent premature harvesting. Towards the end of September harvest was begun in the Danube plains. About October 10 harvest operations favoured by fine weather were going on nearly everywhere. In many places the crop appears considerably damp. In order to hasten the rationalization of the maize crop among farmers the Government has decided to organize the Yearly Maize Competition, even under the present exceptional circumstances. Taking into account the former estimate on the unit yield and the first official estimate of area destined to maize this year it can be calculated that probable maize production in Romania will amount to about 101.4 million centals (169 million bushels).

Available statistical data on the culture of maize in Romania are given in the following table.

| | Area | Production | | Yield | |
|---|---|---|---|---|---|
| | acres | centals | bushels | centals per acre | bushels per acre |
| 1941 (1) | 9 143 033 | 101 964 137 | 182 079 312 | 11.2 | 19.2 |
| 1940 (1) | 8 835 203 | 93 161 261 | 166 365 210 | 10.5 | 18.8 |
| Average 1935-39 (2) | 12 611 433 | 118 660 246 | 211 893 873 | 9.4 | 16.8 |
| % of 1941: 1940 = 100 | 103.5 | 109.4 | 109.4 | | |

(1) After all Territorial changes in 1940. (2) Territory before changes.

*Slovakia:* The area under maize (unmixed crop) in 1941 is estimated at 79,000 acres against 81,500 acres in 1940 and 76,500 acres in 1939, percentages, 97 7 and 104 0

*Argentina* The third estimate of the maize crop in 1940-41 puts it at 225,710,000 centals (403,055,000 bushels) This estimate, with a slight diminution, confirms the previous excellent forecasts Very favourable weather conditions were responsible for this high yield. Maize production of the present season is only 1,3 per cent lower than the abundant one of 1939 40 (228,730,000 centals 408,448,000 bushels), but it is 29 7 per cent above the average of the five previous years (173,987,000 centals 310,692,000 bushels)

*United States* Frosts during the last week in September did not do damage to the maize crop But damage was done where tropical storms prevailed

During the first half of October, harvesting and shelling of maize proceeded rather slowly on account of unfavourable weather conditions. During the week ending October 22, rains stopped maize harvesting everywhere in the Eastern section of the Ohio valley

According to the October Report the production of maize in 1941 is estimated at 1,470,281,000 centals (2,625,502 000 bushels) against 1,371,552,000 (2,449,200,000) in 1940 and an average of 1,302 162 400 (2,325 290,000) in 1935 to 1939, percentages 107 2 and 112,9

## CURRENT INFORMATION ON RICE.

*Bulgaria* At the beginning of September the rice crop was in the ripening stage A good harvest is forecast

*Romania* In view of the good results obtained in 1941 in the cultivation of rice, the Romanian Government is carrying on an intense propaganda for the extension of this cultivation in 1942

*Argentina:* The rice crop of the 1940 41 season is now estimated at 1 235 000 centals 2 743 000 bushels against 2.138 000 centals 4 752 000 bushels in 1939-40 and an average of 1 135 000 centals 2 522,000 bushels, during the five preceding years percentages 57 7 per cent and 108 8 per cent

*United States,* The rice crop has been seriously damaged by storms during the last week in September

According to the October Report the production of rice in 1941 is estimated at 26,070,000 centals (57,034,000 bushels) against 23,739,000 (52,754,000) in 1940 and an average of 22 398,000 (49,774,000) in 1935 to 1939, percentages, 109 8 and 116 4

*Peru* Yields of this year rice crop were good and will cover the alimentary needs of the country.

## CURRENT INFORMATION ON POTATOES.

*Belgium:* The area under potatoes in 1941 is estimated at 259,000 acres against 190,000 acres in 1940 and an average of 383,000 acres in 1935 to 1939, percentages, 136.5 and 67.7.

*Bulgaria* At the beginning of September the picking of potatoes was started under good conditions The potato crop this year appears very good

*Denmark* According to the most recent estimate the area cultivated to potatoes this year is about 180 000 acres against 157,000 in 1941 and 188 000 on the average of the five years ending 1939 percentages 114 7 and 95 7

*Spain* An extraordinary increase of area sown to potatoes is confirmed in the present season Total production is estimated much above average Yields in the chief potato producing provinces appear generally good

*Finland* According to the most recent estimate area cultivated to potatoes this year is about 193 000 acres against 199 000 in 1940 percentage 96 7 The corresponding production is estimated at about 22 950 200 centals (38 250 000 bushels) against 32 254 000 (53 755 000) percentage 71 2

*Hungary* The harvest of early varieties had been done everywhere by the beginning of October and late varieties were being harvested Potato rust caused by rains in August and September was stopped by warm and sunny weather

*United Kingdom* According to press information the area sown to potatoes in 1941 was about 990 000 acres as against 803 000 acres in 1940 and 703 000 acres in 1939

*Slovakia* The area under potatoes in 1941 is estimated at 447 200 acres against 457,100 acres in 1940 and 413 000 acres in 1939 percentages 97 8 and 108 3

*United States* According to the October Report the production of potatoes in 1941 is estimated at 224 720 000 centals (374 533 000 bushels) against 238 633 000 (397 722,000) in 1940 and an average of 222 110 000 (370 183 000 in 1935 to 1939 percentages 94 2 and 101

## SUGAR SEASON AND PRODUCTION

Weather conditions prevailing during the latest period of growth of the sugar beet crop had gradually caused an improvement in the general situation during the months of August September and the first days in October

In the farthest northern zone of Europe after a long period of drought which had lasted until the end of July abundant rains fallen at mid-August were very favourable to the crops which were seriously suffering from lack of humidity Damages done by drought were not entirely made up for but there was an indisputable improvement

In September the weather was rather cold and wet so that sugar beet yields are considerably lower than last year and sugar contents are small This means that the production of sugar will be lower than the amount needed, especially in Finland which suffered most from bad weather

In the sugar beet countries of central Europe, the growth of roots was favoured by warm and rainy weather in August Leaves were tufty and had a

fine colour. Fields appeared regular and uniform, so that at the end of the month the crops in all that zone could be considered satisfactory. It must be said, however, that general conditions of the sugar-beet crops were best in the western regions of central Europe where the state of the cultures was truly excellent in many cases, while, going east, this favourable condition was gradually diminishing.

In the western regions, good weather conditions allowed the crop to make up for the delay caused by late cold in the spring, while in the more eastern regions this delay was only partially compensated.

In September, prevailing sunny weather continued to help the growth of the sugar beet crop and of the roots. It also helped the increase of sugar contents which generally reached normal proportions.

August rains helped the sugar beet crops in the countries of southern Europe. Roots were well developped, of a good weight, and leaves were abundant and healthy.

Very good yields were forecast, and these forecasts proved well founded at harvest time when production appeared to be very abundant in Spain and in the Balcan countries. Italy, on the contrary, has been an exception among the southern countries of Europe. The sugar beet crop has been weak, especially in the central provinces and even more so in the South. This deficiency was due partly to the unfavourable course of the season and partly to maladies of the leaves.

Although the condition of the cultures in some European countries is not as satisfactory as might be desired, on the whole it can be considered good in the majority of them. Summing up, we may state that in spite of delayed and scarce information, and taking into account the improvement of weather conditions in the last months, the condition of roots, sugar contents and area of cultivation, the production of sugar in Europe (not including the U. S. S. R.) may be slightly better than that of last year.

E. R.

## CURRENT INFORMATION ON SUGAR.

*Belgium:* According to a communication from the Ministry of Agriculture and Victualling concerning the sugar season 1941-42, if the area sown to sugar beets as declared in the census of 15 May, 1941, is taken into account, and if an estimated average sugar contents of 16 per cent is obtained, it may be hoped that the total sugar production will be somewhat higher than 5,510.000 centals = 276,000 short tons: i. e., nearly equal to last year.

*Bulgaria:* By the beginning of September the gathering of sugar beets had begun in some regions. Production appears abundant.

According to very recent unofficial information, the sugar beet crop and the production of sugar this year will beat all records of preceding years.

At the beginning of October, the sugar season was at its highest.

*Denmark:* According to the most recent estimate the area cultivated to sugar beet for sugar this year is about 114.000 acres against 103,500 in 1940 and 98,000 on the average of the five years ending 1940; percentages 109 9 and 116.2.

Results of the weekly analyses of sugarbeets:

| WEEK | Average weight of root | | | Average weight of leaves | | | Sugar content | | | Weight of sugar per root | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1941 | 1940 | 1935-1939 | 1941 | 1940 | 1935-1939 | 1941 | 1940 | 1935-1939 | 1941 | 1940 | 1935-1939 |
| | oz | oz. | oz. | oz. | oz. | oz. | % | % | % | oz. | oz. | oz. |
| 2nd. week of September . . . . . | 18.1 | 16.5 | 16 9 | 20.0 | 16.9 | 15.3 | 15.6 | 16.8 | 15.8 | 2.8 | 2.8 | 2.7 |
| 3rd. week of September . . . . . . | 19.0 | 17 6 | 18.1 | 19.9 | 16.4 | 15.1 | 16.3 | 17.3 | 16 0 | 3.1 | 3.0 | 2.8 |
| 4st. week of September . . . . . . | 20 1 | 18.6 | 19.0 | 18.5 | 16.9 | 14.6 | 16.9 | 17.1 | 16.4 | 3 4 | 3.2 | 3.1 |

*Spain:* The favourable forecasts on sugar beets production are confirmed. In the important region of Arragon, the weather was particularly favourable to this crop.

According to a communication from the Union of Sugar Producers, the production of sugar in the 1940-41 season amounted to 3.530,000 centals (176,500 sh. tons) against 1,947,000 centals (97,400 sh. tons) in 1939-40 and an average of 4,478,000 centals (223,000 sh. tons) in the five preceding years. Percentages 181,0 and 79,0. This production represents about 2/3 of national consumption.

*Finland:* According to a comunication from the Association of sugar producers in Finland, the production of raw sugar in 1941-42 is estimated at 110,000 centals (5,500 sh. tons) against 164,660 (8,230) in 1940-41 and an average of 256,730 (12,840) in 1935-36 to 1939-40; percentages, 67,0 and 43,0.

*Hungary:* At the beginning of the month of October sugar beets appeared in good shape, except in some trans-Danubian regions where growth was hindered by drought.

*Italy:* The Bulletin of the National Association of Sugar Producers (Consorzio Nazionale Produttori Zucchero) had published the following communication: According to agreements reached between the National Association of Sugar Producers and the National Association of Sugar Beets Producers, deliveries were made and sugar refining has begun in authorized refineries. During the first fifteen days deliveries were made irregularly and rather slowly, so that many refineries had to work on a reduced scale. This situation must be attributed first of all to the lack of available workmen, who in many beet raising regions were occupied in the gathering in of other products considerably later than usual, and in the second place to scarcity of means of transportation, especially those requiring carburants. During the second half of the month deliveries to factories had been more satisfactory and this improvement had become more noticeable during the last week.

In the second half of the month of August weather conditions were favourable to crops and consequently forecasts on their yields were also better. A poor production was forecast for factories in central Italy and a still poorer one for those in the South of the country.

At the end of August leaves had been almost completely destroyed by beet leaf spot. In several regions the growth of new leaves was noted. This caused a slight reduction in the mean contents of sugar, which however remains above the mean

average of the preceding season. The average sugar content of beets delivered in August is 16,6 per cent.

By August 30, factories adhering to the C. N. P. Z. had received 31,793,000 centals (1,589,600 sh. tons) of sugar beets, and had refined 29,202,000 centals (1,460,100 sh. tons), of which 24,055,000 (1,202,700 sh. tons) for sugar, and 5,146,000 (257,300) short tons for alchool. All the years when forages are scarce, considerable quantities of sugar beets are put aside by farmers for the feeding of animals and especially pigs. Owing to present circumstances this phenomenon may have greater proportions than usual this year.

It is in fact reported that sugar beets for this purpose are being paid 25-30 lire a quintal, while the actual price of beets to be delivered to factories and distilleries is 1,10 lire a grade, i e., 17,60 lire a quintal for sugar beets of 16 per cent. mean polarisation.

The Official Gazzette No 232 of October 1, published a decree of the Ministry dated September 5, 1941 which regulates the production and distribution of sugar, alchool and melasses Here is a summary of the text Factories which transform sugar beets are obliged to use sugar beets of the 1941-42 for the production of alchool and sugar, in order that the production may reach about 600,000 hectanhydres of alchool not including alchool obtained from melasse employed for this fabrication, and about 7,716,000 centals (385,800 sh. tons) of sugar

Eventual reductions which, owing to available quantities and yields of beets, might hve to be made in the production of alchool and sugar, must be in proportion with the quantities indicated above (600,000 hectanhydres of alchool and 7,716,000 centals (385,800 sh. tons) of sugar.

Sugar to be produced during the 1941-42 season should be 30 per cent cristallized and 70 per cent refined

*Netherlands* Results of the weekly analyses of sugarbeets·

| WEEK | Average weight of root | | | Average weight of leaves | | | Sugar content | | | Weight of sugar per root | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1941 | 1940 | 1935-1939 | 1941 | 1940 | 1935-1939 | 1941 | 1940 | 1935-1939 | 1941 | 1940 | 1935-1939 |
| | oz | oz | oz | oz | oz. | oz | % | % | % | oz | oz | oz |
| 1st week of September . | 21.6 | — | — | — | — | — | 15.5 | — | — | 3.3 | — | — |
| 4st. week of September . | 24.0 | — | 25.1 | — | — | — | 16.6 | — | 16.3 | 4.0 | — | 4.1 |

*Serbia:* The production of sugar beets, the harvesting of which was started at the beginning of October, appears to be good. It is forecast that this year crop may amount from 94,000 to 99,000 short tons, thus greatly surpassing last year production.

*Slovakia:* The area under sugar-beet in 1941 is estimated at 71,900 acres against 69,700 acres in 1940 and an average of 54,400 acres in 1938 to 1939; percentages, 103.1 and 132.3.

*United States:* According to the October Crop Report, the production of sugar-beet in 1941 is estimated at 198,660,000 centals (9,933,000 short tons) against 243,840,000 (12,192,000) in 1940 and an average of 192,464,000 (9,623,000) in 1935 to 1939; percentages, 81.5 and 103.2.

*Production of Cane-Sugar.*

| COUNTRIES | 1940-41 (1) | 1939-40 | Average of 1934-35 to 1938-39 | 1940-41 (1) | 1939-40 | Average of 1934-35 to 1938-39 | % 1940-41: 1939-40 = 100 | % 1940-41: Average = 100 |
|---|---|---|---|---|---|---|---|---|
| | 000 centals | | | short tons | | | | |
| **AMERICA.** | | | | | | | | |
| Antigua | 540 | 309 | 520 | 27 000 | 15 000 | 25 984 | 175 | 104 |
| Argentina | 11,845 | 11,469 | 8,804 | 592 218 | 573 455 | 440,171 | 103 | 135 |
| Barbados | 1,698 | 1 587 | 2,718 | 85,000 | 79,000 | 135,905 | 107 | 62 |
| Brazil | 28,506 | 25 923 | 23,231 | 1,425 000 | 1,296 130 | 1,161,530 | 110 | 123 |
| Cuba | (2) 54 678 | 63,163 | 60,266 | (2) 2 733,880 | 3,158 000 | 3,013,269 | 87 | 91 |
| United States (La.&H.I.) | 7,077 | 10 392 | 8,528 | 353 854 | 519,597 | 426,400 | 68 | 83 |
| British Guiana | 4,255 | 3,748 | 4,233 | 213 000 | 190 000 | 211,669 | 114 | 101 |
| Jamaica | 3,527 | 2,227 | 2,289 | 176 000 | 111 000 | 114,455 | 158 | 154 |
| Martinique. | 1,213 | 1,323 | 1,167 | 61 000 | 70 000 | 58,359 | 92 | 104 |
| Mexico | 6,900 | 6 834 | 6,763 | 345,000 | 340 000 | 338,128 | 101 | 102 |
| Peru | 9,590 | 9,921 | 8,426 | 480 000 | 500,000 | 421 291 | 97 | 114 |
| Puerto Rico | 18,151 | 20,375 | 17,748 | 907,500 | 1,018 700 | 887,390 | 89 | 102 |
| Dominican Republic | (2) 8,300 | 10,188 | 9,339 | (2) 415,000 | 509 400 | 466 926 | 81 | 89 |
| St Kitts | 851 | 692 | 700 | 42 500 | 34 600 | 34,977 | 123 | 122 |
| Trinidad | 2,734 | 2,065 | 3,086 | 137,000 | 103,250 | 154 308 | 132 | 89 |
| Venezuela | 611 | 542 | 514 | 30,500 | 27 100 | 25 706 | 113 | 119 |
| *Total America* | *160,476* | *170,758* | *158,332* | *8,024,452* | *8,545,232* | *7,916,468* | *94* | *101* |
| **ASIA** | | | | | | | | |
| Taiwan | 20,803 | 26,630 | 23 776 | 1,040 100 | 1,331,500 | 1,188,782 | 78 | 87 |
| India | 76,655 | 72 598 | 72,761 | 3,833 000 | 3,630,000 | 3,638,000 | 106 | 105 |
| Japan | 2,399 | 3,386 | 2 751 | 119 900 | 169,300 | 137,560 | 71 | 87 |
| Java | 38,361 | 34,569 | 23,832 | 1 920,000 | 1,728,000 | 1,191,582 | 111 | 161 |
| Philippines | (2) 21,839 | (2) 21,065 | 21,141 | (2) 1,091,900 | (2) 1,053,200 | 1,057,042 | 104 | 103 |
| *Total Asia* | *160,057* | *158,248* | *144 261* | *8,004,900* | *7,912,000* | *7,212,966* | *101* | *111* |
| **AFRICA.** | | | | | | | | |
| Egypt. | 3,924 | 3,524 | 3,213 | 196,000 | 176 198 | 160,668 | 111 | 122 |
| Mauritius | 6,972 | 5,059 | 6,150 | 348,600 | 252,930 | 307,505 | 138 | 113 |
| Reunion | 1,874 | 1,622 | 1,782 | 94,000 | 81,100 | 89,098 | 116 | 105 |
| Union of South Africa | 11,463 | 11 839 | 10,010 | 570,000 | 592 000 | 500,515 | 97 | 115 |
| *Total Africa* | *24,233* | *22,044* | *21,155* | *1,208,600* | *1,102,228* | *1,057,786* | *110* | *115* |
| **OCEANIA** | | | | | | | | |
| Australia | 18,010 | 20,787 | 16,607 | 900,500 | 1,039,400 | 830,341 | 87 | 108 |
| Hawaii | 19,379 | 19,028 | 19,112 | 969,000 | 951,400 | 955,596 | 102 | 101 |
| Fiji Islands | 2,315 | 2,205 | 2,973 | 116,000 | 100,000 | 148,630 | 105 | 78 |
| *Total Oceania* | *39,704* | *42,020* | *38,692* | *1,985,500* | *2,090,800* | *1,934,567* | *94* | *103* |
| **TOTALS** | **384,470** | **393,070** | **362,440** | **19,223,452** | **19,650,260** | **18,121,787** | **98** | **106** |

(1) Approximate data — (2) Willet & Gray estimate.

According to the October Crop Report the production of sugarcane for sugar in 1941 is estimated at 108,880,000 centals (5,444,000 short tons) against 77,620,000 (3,881,000) in 1940 and an average of 113,632,000 (5,682,000) in 1935 to 1939; percentages, 140 3 and 95.8.

## CURRENT INFORMATION ON VINES

*Bulgaria* In spite of damage caused to vines by attacks of mildew the production of wine raisins is more promising than last year. By the beginning of September the gathering of table grapes was in full swing.

The production of grapes in 1941 is estimated at 1 764 000 centals against 2 482 00 in 1940 and an average of 2 461 000 in 1937 to 1938 percentages 71.1 and 71.4.

The production of wine in 1941 is estimated at 44 000 000 Imperial gallons 53 000 000 American gallons (against 15 403 000 (18 500 000) in 1940 and an average of 40 500 000 (48 600 000) in 1935 to 1939 percentages 28.7 and 108.–

*[illegible]* According to unofficial preliminary information the results of vintage were not [illegible] to allow [illegible] with wine rationing but were sufficient to keep up [illegible] with [illegible] slightly higher [illegible]. It is forecast that the total production will amount to from [illegible] million imperial gallons (1 450 [illegible] million American gallons [illegible] consumption [illegible] destined to distilleries.

*Hungary* From the [illegible] th to the [illegible] th September the weather was favourable to the development of vines.

*Rumania* [illegible] the middle of October wine production appeared weak all over the country including Bessarabia. In this last province even the vintage of hybrids will be weak. Owing to unfavourable forecasts on the production and to transportation difficulties the tendency [illegible] increases in the price of wine.

*[illegible]* The production of grapes in 1941 is estimated at [illegible] 575 000 pounds against [illegible] in 1940 and an average of [illegible] 1935 to 1939 percentages, [illegible] and [illegible].

*United States* The total production of grapes in 1941 is estimated at 51 388 000 centals [illegible] short tons against 50 8 8 000 [illegible] in 1940 and an average [illegible] 000 [illegible] 000) in 1935 to 1939 percentages [illegible] and [illegible].

*Italy* According to press reports the production of raisins in 1941 amounts to nearly [illegible] centals [illegible] short tons against [illegible] 000 centals 33 000 short tons in 1940 and [illegible] centals [illegible] 000 short tons in 1939. This year production appears to be 25 per cent lower than the average for the five years 1935/1939 ([illegible] 000 centals [illegible] 500 short tons) and [illegible] per cent the average of the ten years 1930-39 (1 245 000 centals 62 400 short tons). The yearly reports prepared last July, indicated that at that time the condition of vines was generally satisfactory. Floods and excessive wetness during the 1940-41 winter did not cause considerable damage.

## CURRENT INFORMATION ON OLIVES.

*Spain* A normal production is forecast in the most important olive producing regions. In the other regions yields are good enough while in some places they are absolutely poor.

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** *St. ro Ingl.*

# FORECASTS ON WORLD LINSEED PRODUCTION IN 1941/42.

By Dr. A. Di Fulvio.

Information available this year regarding the linseed crop, especially about basic elements of orientation and statistical evaluation (area sown, vegetative development expressed in terms of cultural notes, and forecasts on results in the different parts of the world) is very scarce and generally less reliable than ordinarily. At this point it must be mentioned that this lack of information is almost exclusively referable to the countries of Europe within the old frontiers of 1938 and not including the Soviet Union within its frontiers at the same date. It must also be mentioned that Europe has a very limited share in the world linseed production

In spite of the considerable increase of area (about over one third) sown to linseed in Europe where it gradually grew from 865,000 acres in 1929-1933 to 1,161,000 in 1934-1938, the production of this continent within the five years under consideration represented hardly 8.2 per cent of the world total, not including the Soviet Union In 1939 the proportion was still slightly below 10 per cent notwistanding the fact that area had been further increased

Our remark regarding the very limited importance of the European linseed production leads to a brief examination of the linseed culture in general over this continent, such as it results from other reliable sources of the most different kind.

Rainy and relatively cold weather at the beginning of Spring delayed the germination of linseed. Later, weather conditions became generally favourable to the developpment of the plants, their flowering and seed formation In some countries, cultural care was not as assiduous and efficacious as in previous years, especially on account of labour shortage. As regards area sown this year, it can be said that there was a notable increase as compared with 1940 and even more so, as compared to the five preceding years.

This increase is the result of the autarchic policies followed by the majority of the European countries in view of the great difficulties met in trading with their customary oversea markets.

Information on production is even more rare and fragmentary. It seems however that, owing to the spreading of the war, at the beginning of Summer, in Eastern and North-Eastern Europe (which is the most important linseed producing center of the continent, not including the Soviet Union, the situation of which is examined separately), damage was caused, especially in Poland and in the Baltic countries. It must be mentioned, on this point, that the Soviet Union, after the occupation of a part of former Poland in September 1939 and the successive incorporation of the three Baltic countries (Latvia, Lithuania and Estonia) had absorbed over 50 per cent of the whole linseed production of the European continent.

On the basis of available information, the particular situation of the linseed production in the different linseed producing countries this year may be thus summarized:

In *Belgium*, the area sown to linseed, which for some years already had been continuously increased, decreased considerably in 1941: it was hardly 44,000 acres, against 113,000, in 1940 and 75,000 as an average during the five preceding years. Besides, in some regions, new sowings were necessary on account of unfavourable weather conditions.

In *France*, according to unofficial sources, the area sown in 1941 seems to have been increased 65 per cent as compared with last year, when however there had been a 45 per cent decrease as compared with 1939 and 18 per cent as compared with the average of the five preceding years. It seems also that results obtained this year were satisfactory.

Soviet information regarding the Baltic countries particularly Lithuania, Latvia and Estonia, that taken altogether had furnished in 1939 over 1/4 of the whole European linseed production, are vague and fragmentary, dealing mostly with a plan of Spring sowings of which the details have never been communicated. In *Lithuania*, sowings at the 10th of June had been done on an area covering 90 per cent of the plan; in *Estonia*, the area set by the plan is said to have been surpassed by 2.2 per cent. As regards linseed sowings in *Latvia*, it is known only that they were done under favourable conditions. No forecast, even grossly nearing the mark, can be made about the volume of production in that country, especially in view of the fact that war was raging there at harvesting time.

In *Hungary*, weather conditions were not favourable to the crop, destined chiefly to the production of seed. In several regions, the fields were covered with weeds. The thrashing of this linseed crop, the area of which extends over 2/3 of the total, has given hardly mediocre yields.

In *Romania*, linseed has been cultivated this year over an extensive area, which, according to Government plans, should have attained 49,000 acres, as against 35,000 acres actually cultivated in 1940. Altogether, yields in seed were average.

In *Bulgaria*, the area sown in 1941 was more than double the average of the five preceding years ending in 1939 and was 40 per cent. above the figure of 1940 (12,000 acres). Yield in seeds was abundant.

In *Croatia*, linseed was cultivated this year over an area of 22,000 acres, representing nearly 60 per cent of the total destined normally to that crop in former Jugoslavia. It seems that seed production was satisfactory both from the point of view of quality and quantity. No official information is available regarding the other most important linseed producing countries, *Germany*, *Italy*, the *Netherlands* and *Polish territories*. In each one of these countries the area cultivated was strongly increasing up to 1940. It is probable that in 1941 this tendency was accentuated in view of increased needs of war economy.

The latest official information concerning the *U. S. S. R.* ceased in June. This country comes right after Argentina among linseed producting countries with crops which, in the last years, amounted to over 1/5 of total world production. Exports of linseed from the Soviet Union, however, were almost negligible, as nearly the whole yearly production (16,535,000 centals = 29,526,000 bushels) was absorbed by the growing need of the home market. The greatest part of the

Russian production is represented by the "Dolgunetz" variety which is used for flax and seed. This variety requires a rather wet climate, and it is cultivated in the central and northern parts of the country, north of the zone of the Black Lands. According to the geographic distribution in 1938, which was very nearly the same as now, over 4/5 of the "Dolgunetz" cultivation, though much subdivided, is concentrated in the territories of European Russia. Among the provinces of the Federal Republic, the outstanding ones are Kalinin with 16.2 per cent and Smolensk with 13.4 per cent, while in all the other provinces the proportion is lower than that of Leningrad (7.6 per cent.). Percentages relating to the two republics of White Russia and Ukraina were respectively 11.2 and 6.0 per cent. With the "Dolgunetz" variety, is widely cultivated in the Soviet Union the variety known as "Kudriash" which is specialised in the production of seed. Area sown to this variety, contrary to what happens for the "Dolgunetz", which since 1938 has been very stable, shows a clear tendency to increase. The culture of the "Kudriash" variety requires a rather warm and dry climate, and is predominant in the black lands of Ukraine, in the southern Volga region and in many territories of Central Asia.

*Area cultivated on flax "Dolgunetz" in U. S. S. R.*

(Year 1938)

| Provinces and Republics | Area cultivated: Absolute data (1,000 acres) | Area cultivated: Percentage of total of the Union (%) |
|---|---|---|
| Kalinin | 754 | 16.2 |
| Smolensk | 625 | 13.4 |
| White Russia | 521 | 11.2 |
| Leningrad | 353 | 7.6 |
| Kirov | 343 | 7.4 |
| Jaroslav | 321 | 6.9 |
| Ukraina | 279 | 6.0 |
| Vologda | 215 | 4.6 |
| Udmurtsk | 163 | 3.5 |
| Ivanov | 141 | 3.0 |
| Omsk | 109 | 2.3 |
| Novosibirsk | 101 | 2.2 |
| Moscow | 82 | 1.8 |
| Orel | 74 | 1.6 |
| *Total of Provinces and Republics considered* | **4,081** | **87.7** |
| TOTAL OF THE UNION | **4,651** | **100.0** |

The situation of the linseed production as a whole during the present season in the U. S. S. R., is characterised by a delay in the realisation of the plan of sowings owing to cold and wet weather at the beginning of Spring. In the province of Kalinine, which is the most important linseed center of the Union, by May 25 had been sown 620,000 acres, i. e., 88 per cent of the area foreseen by the plan, as against 98.7 per cent last year at the same date. In the pro-

vince of Vitebsk, which is the most important linseed center of White Russia, at the end of May 93.7 per cent of the plan of sowings had been completed. Later, improved weather conditions caused an intensification of sowings.

*Area cultivated on flax "Kudriash" in U. S. S. R.*

(Year 1938)

| Provinces and Republics | Area cultivated | |
|---|---|---|
| | Absolute data | Percentage of total of the Union |
| | (1,000 acres) | % |
| Ukraina | 151 | 17.3 |
| Stalingrad | 126 | 14.5 |
| Tadjikistan | 91 | 10.5 |
| Uzbekistan | 79 | 9.1 |
| Tataria | 67 | 7.7 |
| Omsk | 44 | 5.1 |
| Cheliabinsk | 42 | 4.8 |
| Rostov | 30 | 3.4 |
| *Total of Provinces and Republics considered* | *630* | *72.1* |
| Total of the Union | **870** | **100.0** |

In normal times linseed harvest operations last until the first decade in September, by September 5, 1940 in the Union taken as a whole, 95 per cent. of the harvest had been done while at the same time in 1939 the proportion was 97 per cent. This year, all information on this point is lacking, and even a rough estimate on the volume of the crop is impossible. It is probable, at any rate, that military activities over many important linseed producing zones of the Union have reduced to a more or less remarkable degree the amount of the production which was forecast before the breaking of the war.

In North America, the tendency towards an increase of the crops which had been noticeable for some years, has ceased in 1941 in the United States, while, it has increased to an exceptional degree in Canada. The area sown to linseed in the *United States* (3,227,000 acres) has remained within about the same level in 1940 (3,235,000), but it has been by about 119.8 per cent. above the average of the five preceding years (1,468,000 acres). According to the estimate of October 1, the production of linseed obtained this year in that country amounts to 17,822,000 centals – 31,825,000 bushels, which is an absolute record figure in the post-war period, as it slightly surpasses (1.9 per cent.) the already very high figure of 1940 and by far (188.3 per cent) the figure of the average production of the five preceding years (6,181,000 centals – 11,037,000 bushels).

In Canada the crop of linseed, favoured by a number of protective measures taken by the Government, increased this year in an extraordinary way. The area sown to linseed in 1941 is 141.1 per cent above the 1940 figure, and has more than trebled in comparison with the average of the five preceding years. Almost the whole of this culture is concentrated in the Prairie Pro-

vinces, where in 1941 940,000 acres on a total of 958,000 were cultivated. According to an estimate made in September, the Canadian production in 1941 amounted to 4,123,000 centals (7,362,000 bushels) with en increase of 130.9 per cent over 1940 and 380 3 per cent above the average of the five year period ending in 1939.

*Linseed Production in the United States and Canada.*

| | 1941 | 1940 | Average 1935-39 | % 1941: 1940 = 100 | % 1941: Average = 100 |
|---|---|---|---|---|---|
| | | (1 000 centals) | | | |
| United States . . . . . . | 17,822 | 17,482 | 6,181 | 101.9 | 288 3 |
| Canada . . . . . . . . | 4,123 | 1,785 | 858 | 230 9 | 480.3 |
| Total . . . | 21,945 | 19,267 | 7,039 | 113 9 | 311 7 |
| | | (1,000 bushels of 56 lb) | | | |
| United States . . . . . . | 31,825 | 31,217 | 11 037 | 101 9 | 288 3 |
| Canada . . . . . . . . . . | 7,362 | 3,189 | 1 533 | 230 9 | 480 3 |
| Total . . . | 39,187 | 34,406 | 12,570 | 113 9 | 311 7 |

The total production of these two countries is thus exceptionally high (21,945,000 centals — 39,187,000 bushels), and is about 14 per cent higher than the already high one of 1940, and 211 7 per cent. above the average production of the five preceding years.

According to the final estimate in June, production of the present season in *India*, amounted to 9,632,000 centals (17,200,000 bushels) against 10,438,000 centals (18,640,000 bushels) in 1940, and against 9,547,000 centals (17,048,000 bushels) as an average for the five years 1935-1939. This production was obtained over on area of 3,583,000, acres which is 3.6 and 2.1 per cent. smaller than acreage in 1940-41 and the average, respectively

Available official information indicate that in *Argentina*, which has an absolutely preponderant share in the linseed world production and trade, the sowing of this crop was done this year with some delay in the provinces of Santa Fé and Córdoba, especially in the zones previously sown to maize, where the gathering in of that crop had been retarded by bad weather.

Germination was on the whole normal and the growth of the crop proceeded well until August According to the latest report published at the beginning of October, the September drought and frosts caused rather serious damage to linseed. About the end of September the general condition of the crop varied from average to good. This condition may be still considerably modified before harvest time (which is generally in December) as a consequence of weather conditions during that period, from which the percentages between area sown and harvested largely depend. These percentages varied between a minimum of 4.4 1931-32 and a maximum of 28.8 in 1933-34, with an average of 16.8 in the quinquennium 1935-36/1939-40.

*Linseed areas sown and harvested in Argentina.*

| YEARS | AREAS SOWN | | | AREAS HARVESTED | |
|---|---|---|---|---|---|
| | 1st estimates | Final estimates | Difference | Final estimates | % of final estimates of sown area |
| | (1,000 acres) | (1,000 acres) | % | (1,000 acres) | % |
| 1941-42 | 6,746 | (1) 6,739 | (1) — 0.1 | ... | ... |
| 1940-41 | 6,672 | 6,758 | + 1.4 | ... | ... |
| 1939-40 | 7,413 | 7,599 | + 2.5 | 5,602 | 73.7 |
| 1938-39 | 6,870 | 6,608 | — 3.8 | 5,787 | 87.6 |
| 1937-38 | 6,301 | 7,023 | + 11.5 | 5,691 | 81.0 |
| 1936-37 | 7,290 | 8,646 | + 18.6 | 7,626 | 88.2 |
| 1935-36 | 6,128 | 6,573 | + 7.3 | 5,607 | 85.3 |
| *Average 1935-36/1939-40* | *6,800* | *7,290* | + *7.2* | *6,063* | *83.2* |
| 1934-35 | 7,216 | 8,103 | + 12.3 | 7,104 | 87.7 |
| 1933-34 | 6,919 | 6,855 | — 0.9 | 4,878 | 71.2 |
| 1932-33 | 7,290 | 7,401 | + 1.5 | 6,395 | 86.4 |
| 1931-32 | 8,204 | 8,641 | + 5.3 | 8,263 | 95.6 |
| 1930-31 | 7,537 | 7,512 | — 0.3 | 6,749 | 89.8 |
| *Average 1930-31/1934-35* | *7,433* | *7,702* | + *3.6* | *6,678* | *86.7* |

(1) Third estimate.

Notwitstanding difficulties met in the marketing of the 1940-41 production and the considerable surpluses existing in the country, the area destined to linseed in 1941-42 has not been as reduced as it was generally believed it would. According to the second estimate published last month, the area sown during the present season was very nearly the same as in 1940-41, and showed a decrease of hardly 7.5 per cent as compared with the average of the five preceding years. On October 22 the Argentine Government published another estimate which shows a decrease of hardly 15,000 acres over the estimate made in September.

Basing our calculations on this last estimate and on the condition of the crop at the beginning of October, and provided there are no exceptional damages done in the linseed regions of the country by unforeseen causes, it can be roughly forecast that the Argentine linseed production in 1941-42 will be of about 31 million centals = 55 million bushels i. e., lower than average (32,902,000 centals = 58,754,000 bushels).

In *Uruguay* plowing was hindered by a rainy Autumn, while a dry and cold winter was favourable to linseed sowings. In September the condition of the crop was judged generally good. The area sown to linseed in 1941-42 was about 314,000 acres, which means there has been a decrease of 25.7 per cent. as compared with 1940-41 and of almost 23 per cent. as compared with the average of the five preceding years. This decrease is attributable chiefly to the existence of linseed unsold surpluses of the previous season. As in the case of Argentina, the results of the production in Uruguay are dependent on weather conditions from October to December.

In *Egypt*, the 1941 linseed culture has strongly increased. The area sown to this crop (32,000 acres) is 220 per cent. more than in 1940, and 350.7 per cent. above the average for the five preceding years. It seems that the yield was also exceptionally high.

* * *

In a provisional way, the condition of the linseed production in the different countries of the world as it results from this outline of the situation, may be thus summarized. In Europe, linseed crop has been again increased; but, on account of the war raging in the most important linseed regions of the continent, production would not seem to be in proportion with increased area As regards production in the Soviet Union, available data are too vague to allow fixing its volume even in the roughest way, and this the more so as it is impossible, at present, to foresee the amount of damage caused by the war.

Production in North America has been exceptionally abundant, having more than trebled as compared to the average, on account of the increase of area sown and of favourable weather conditions.

In India production was average, while in Argentina and Uruguay it appears to be below average. Total world production of linseed in 1941-42 seems to have been considerably above average and probably also higher than last year.

All in all, the condition of the market continues to be quite uncertain owing to a strong decrease of imports to the European continent which bought nearly one half of world linseed exports. With the arrival on the market of exportable surpluses of the new Argentine crop (which will be added to the yet unsold exceptionally high stocks of the 1940 production), this situation may become worse next year, considering that North America, owing to a very abundant production, will probably strongly reduce its imports that normally amounted to about 11,000,000 centals (20,000,000 bushels).

## CURRENT INFORMATION ON FLAX.

*Belgium:* The area under flax in 1941 is estimated at 44,000 acres against 113,000 acres in 1940 and an average of 75,000 acres in 1935 to 1939; percentages, 38.7 and 58.1.

*Bulgaria.* The production of flax seeds and fibre this year appears good By the beginning of September harvest was over.

*Finland:* According to the most recent estimate the area cultivated to fibre this year is about 7,900 acres against 4,240 in 1940; percentage 186.5.

*Slovakia:* According to the most recent estimate area cultivated to flax in 1941 is 7,700 acres, against 7,000 in 1940 and 6,900 in 1939; percentages: 109.7 and 112.5. The corresponding fibre production was estimated in 1940 at about 37,400 centals against 34,000 in 1939. The corresponding seed production was estimated in 1940 at about 23,800 centals (42,500 bushels) against 26,500 centals (47.300 bushels).

*Argentina:* The area under flax in 1941-42 is estimated at 6,739,000 acres against 6,760,000 acres in 1940-41 and an average of 7,301,000 acres in 1935-36 to 1939-40; percentages: 99.7 and 92.3.

*United States*. According to the recent estimate area cultivated to linseed is 3 228 000 acres against 3 234 000 in 1940 and 1 [illegible] 000 on the average of the preceding 5 year period percentages 99 8 and 210 8. The corresponding production is estimated at about 17 822 000 centals (31 825 000 bushels) against 17 482 000 (31 [illegible]) and 6 181 000 (11 037 000) percentages 101 9 and 288 3.

*India*. According to the final report area cultivated to flax crops in 1940 41 is 3 583 000 acres against 3 715 000 in 1939 40 and 3 661 000 on the average of the preceding 5 year period percentages 96 4 and 97 9. The corresponding production is estimated at about 9 632 000 centals (17 200 000 bushels) against 10 438 000 (18 640 000) and 9 547 000 (17 048 000) percentages 92 3 and 100 9.

## CURRENT INFORMATION ON COTTON

*Bulgaria*. Unfavourable weather conditions during the month of August have hindered the normal development of cotton.

*Argentina*. The area sown to cotton in 1941 42 is estimated at [illegible] 000 acres against 832 000 acres in 1940 41 and an average of [illegible] acres in 1935 36 to 1939 40 percentages 110 [illegible] and [illegible].

*Brazil*. The second estimate of the 1940 41 season for the southern cotton producing States points to a production of nearly 1 9[illegible] 000 bales of 478 lb net weight against 1 511 [illegible] in 1939 40 and 1 05[illegible] as an average for the five preceding years. Percentages [illegible] and [illegible]. The third estimate for the northern cotton States points to a production of [illegible] bales of 478 lb net weight against [illegible] and 74[illegible] respectively. Percentages [illegible] and [illegible]. Total production in Brazil would thus amount to about [illegible] bales [illegible] per cent over last year and [illegible] per cent above the 5 year average. The 1940 41 production constitutes a new record and is about [illegible] bales larger than the record one of the year before.

The three most important consumers of Brazilian cotton are at present in order of importance Japan Canada and the United Kingdom.

*United States*. During the last week of September cotton picking and ginning progressed well in the Eastern section of the belt but retarded in the West as a consequence of unfavourable weather. The first week of October has not been favourable to cotton and progress was mostly unsatisfactory except in the central section of the belt. The following week cotton advanced in the Eastern and central belt and during the week ended October 22 conditions continued to be favourable for picking and ginning in the East while in the North West they have been unfavourable.

### Summary of the Cotton Reports issued by the Government of the United States during the cotton season (August 1-July 31)

| | Provisional estimates for dates indicated 1941 42 | Final estimates 1940 41 | Final estimates Average 1935 36 to 1939 40 | Percent 1941 42: 1940 41 = 100 | Percent 1941 42: Aver = 100 |
|---|---|---|---|---|---|
| ***Report referring to July 1*** | | | | | |
| Area in cultivation (acres) | 23 519 000 | 24 871,000 | 28 496 000 | 94 6 | 82 5 |
| ***Report referred to August 1*** | | | | | |
| Area left for harvest (acres) | (1) 23 102,000 | (2) 23 861,000 | (2) 27 788 000 | 96 8 | 83 1 |
| Crop condition (per cent of normal) | 72 | 72 | (3) 72 | — | — |
| Production (4) | 10,817,000 | 12,565,000 | 13,148 000 | 86 1 | 82 3 |
| Yield of lint per acre, in lb | 224 4 | 252 5 | (3) 205 4 | 88 9 | 109 3 |

| | Provisional estimates for dates indicated 1941 42 | Final estimates 1940 41 | Final estimates Average 1935 36 to 1939 40 | Percent 1940 41 = 100 | Percent Aver = 100 |
|---|---|---|---|---|---|
| *Cotton ginned to August 1* (5) | 1 966 | 3[illegible] 187 | 114 716 | 6 1 | 1 7 |
| *Cotton ginned to August 16* (5) | 74 101 | 1[illegible]9 420 | 34[illegible] 397 | 43 7 | 21 6 |
| *Report referred to September 1* | | | | | |
| Area left for harvest (acres) | (6) 2[illegible] 633 000 | ([illegible]) [illegible]3 861 000 | (2) 27 788,000 | 94 9 | 81 4 |
| Crop condition (per cent of normal) | 65 | 74 | (3) 63 | — | — |
| Production (4) | 1[illegible] 710 000 | 1[illegible] 565 000 | 13 148 000 | 85 2 | 81 5 |
| Yield of lint per acre in lb | [illegible]2 6 8 | 25[illegible] 5 | (3) 205 4 | 89 8 | 110 4 |
| *Cotton ginned to September 1* (5) | 504 125 | 605 7[illegible]8 | 1 424 198 | 83 2 | 35 4 |
| *Cotton ginned to September 14* (5) | 2 0[illegible]3 414 | 1 805 621 | 3 55[illegible] 51[illegible] | 115 9 | 58 8 |
| *Report referred to October 1* | | | | | |
| Crop condition (per cent of normal) | 64 | 72 | (3) 64 | — | — |
| Production (4) | 1[illegible] 0[illegible]1 [illegible] | 12 565 000 | 13 148 000 | 88 0 | 84 1 |
| Yield of lint per acre in lb | [illegible]34 | [illegible]52 5 | [illegible]05 4 | [illegible]2 8 | 114 0 |
| *Cotton ginned to October 1* (5) | [illegible] 713 0[illegible] | 3 [illegible]24 0[illegible]4 | [illegible] 35[illegible] [illegible]53 | 1[illegible]1 | 74 1 |
| *Cotton ginned to October 18* (5) | [illegible] 855 8[illegible] | [illegible] 5[illegible]3 | 8 805 [illegible]41 | [illegible]7 5 | 77 9 |

(1) Area under cultivation on 1 July less the ten year (1931 40) average abandonment from natural causes 1 9 per cent — (2) Area actually harvested — (3) Ten year (1930 39) average — (4) In bales of 478 lb net weight and exclusive of linters — (5) In running bales counting round bales as half bales and exclusive of linters — (6) Area in cultivation on July 1 1941 less 3 8 per cent representing the area which has been or will be abandoned from natural causes after that date

*Mexico* The production of ginned cotton in 1941 is estimated at 333 400 bales of 478 lb net weight against 288 000 in 1940 and an average of 320 400 in 1935 to 1939 percentages 115 8 and 104 1

*India* According to the first forecast referred to the area under cotton at the beginning of August 1941 in all India, this area is estimated at 12 475 000 acres against 13 414 000 acres in 1940 41 and an average of 14 952 000 acres in 1935 36 to 1939 40 percentages 93 0 and 83 4

*Egypt* Cotton production in 1941 is officially estimated now after the revision of all statistical data at 1 522 400 bales of 478 lb net weight compared with 1 900 100 in 1940 and 1 896 100 on the average of the 5 year period 1935 39 percentages 80 1 and 80 3 This year's crop is then the smallest one after that of 1932 the cotton crisis year which amounted to 1 027 000 bales

At the beginning of September 50 per cent of bolls were open in the southern Delta 60 per cent in the irrigated zones of Upper Egypt 80 per cent in the basin zone and 30 per cent in the northern Delta Picking was progressing in a satisfactory manner and the Ministry of Agriculture officially estimated that it has been done in the measure of 30 per cent of the total in the basins 15 per cent in the irrigated zone of Upper Egypt, while South of the Delta work was just beginning On the whole picking is one week in advance over last year The condition of the culture however is below average on account of insufficient fertilization of difficulties met with in the irrigation of cultures in some zones and of adverse weather conditions during the vegetative period of the plants

During the first half of September, the weather has been favourable to the crop Ripening and opening of bolls was satisfactorily progressing, and picking was going on in the South of the Delta and Upper Egypt while in the basins it had been done by 80 per cent of the total, and was beginning North of the Delta

Measures have been taken to limit cotton production in 1942. It has been decided that next Spring not more than 27 per cent of agricultural land in the Delta and 23 per cent. in Middle and Upper Egypt can be sown to cotton. The probable result of these measures will be a decrease of from 20 to 25 per cent. of cotton area as compared with the average for the five years 1934-39

## CURRENT INFORMATION ON HEMP.

*Bulgaria:* The production of hemp seeds and harl appeared very good at the beginning of September when harvest operations were nearly over.

*Slovakia:* According to the latest estimate area cultivated to hemp is 9,400 acres, against 9,500 in 1940 and 10,000 in 1939, percentages 98.2 and 93.9. The corresponding fibre production was estimated in 1940 at about 64,500 centals against 64,600 in 1939, and seed production was estimated in 1940 at about 40,300 centals against 48,700 in 1939

*Turkey:* According to press information the 1941 hemp crop in Turkey was very abundant, and it is estimated to amount to 13,200,000 lbs of fiber, against hardly 4 400 000 lbs in 1940

## CURRENT INFORMATION ON TOBACCO.

*Belgium* The area under tobacco in 1941 is estimated at 7,630 acres against 5,070 acres in 1940 and an average of 6,410 acres in 1935 to 1939, percentages, 150.4 and 118.9

*Bulgaria* Cutting, storing and drying of tobacco leaves began nearly everywhere by the end of August and was going on under good conditions during the first decade in September

Owing to drought and other causes, tobacco production within the ancient frontiers of the country, will be this year about 20 per cent below that of last year, the Ministry of Agriculture has announced In the regions recently acquired by Bulgaria, production is also lower than that of last year In fact the area sown to tobacco this year in that part of Thrace bordering on the Aegean sea is 50 per cent less than the year before In the regions of Skophe and Bitoli production appears weak, in spite of the fact that area was not reduced. For the whole of Bulgaria, including the regions recently annexed, tobacco production this year is estimated at about 132,000,000 lbs Precise information is yet lacking in regard to the quality of tobacco of the new crop, but it is believed that it will not be worse than last year Fine dry weather during the month of September gives good hopes for an improvement of the quality, and the more so as the weather facilitated the operations of storing and drying of tobacco leaves

*Canada* According to the most recent estimate area cultivated to tobacco is 65,700 acres, against 67,900 in 1940 and 69,400 on the average of the preceding 5-year period, percentages: 96.8 and 94.7. The corresponding production is estimated at about 67,300,000 lbs against 60,383,000 lbs. and 76,556,000 percentages 111.5 and 87.9

*United States* According to the October crop Report, the production of tobacco in 1941 is estimated at 1,254,396,000 lb. against 1,451,966,000 lb. in 1940 and an average of 1,453,120,000 lb. in 1935 to 1939, percentages, 86.4 and 86.3.

*Dominican Republic:* According to press information the tobacco crop in 1941 is estimated at nearly 78 million lbs. This production is considered rather low, seeing that the normal yearly production varies from between 20 and 25 million lbs.

## CURRENT INFORMATION ON HOPS.

*Belgium:* The area under hops in 1941 is estimated at 1,400 acres against 1,820 acres in 1940 and an average of 2,130 acres in 1935 to 1939; percentages, 76,7 and 65.7.

*Canada:* Production of hops in British Columbia this year is expected to be considerably smaller than last years' crop of 1,601,500 lbs. Mildew has caused damage. Acreage has been increased considerably, but the new acreage will not come into production until next year.

In Ontario, where about 200 acres were grown last year, the weather has been excessively dry.

*United States.* According to the October Report the production of hops in 1941 is estimated as 40,552,000 pounds) against 42,552,000 in 1940 and an average of 38,002,000 in 1935 to 1939; percentages, 95.3 and 106.7.

## CURRENT INFORMATION ON OTHER PRODUCTS.

### Groundnuts.

*United States:* Area cultivated to groundnuts is 1,908,000 acres, against 2,007,000 in 1940 and 1,629,000 on the average of the preceding 5-year period; percentages. 95.1 and 117.1 The corresponding production is estimated at about 14,866,000 centals against 17,343,400 and 12,219,620 percentages. 85.7 and 121.7.

### Colza, sesame and mustard.

*Bulgaria·* At the end of August the sesame crop was in fine condition and well developped.

*India:* According to the final report area cultivated in 1940-41 to rape and mustard is 6,063,000 acres, against 6,113,000 in 1939-40 and 5,511,000 on the average of the preceding 5-year period; percentages: 99.2 and 110.0. The corresponding production is estimated at about 24,259,000 centals angaist 25,043,000 and 21,343,000; percentages: 96.9 and 113.7.

*Japan:* According to information communicated by the Ministry of Agriculture and Forests, the 1940 colza crop was the poorest since 1934. The production was only 2,398,000 centals (4.797,000 bushels) as against 2,654,000 (5,308,000) in 1939 and an average 2,643,000 (5,286,000) in the preceding five years. Percentages: 90.4 and 90.7.

### Soyabeans.

*Bulgaria:* The harvesting of soyabeans was over by the end of August.

### Sunflowers

*Bulgaria:* The harvesting of sunflowers was started at the beginning of September The sunflower seed crop this year is very abundant.

## CURRENT INFORMATION ON FODDER CROPS.

*Bulgaria* Until September improved meadows had been cut twice In some places lucerne meadows had been cut even more than twice The quality of hay is very good The harvest of lucerne seeds appears to be about average Pastures are in good conditions

*Denmark* Area sown to fodder roots in 1941 compared to that of 1940 and to the preceding five years average was as follows

| Crops | 1941 | 1940 | Average 1935/1939 | % 1941: 1940 = 100 | % 1941: Average = 100 |
|---|---|---|---|---|---|
| | | acres | | | |
| Kohl rabi | 455 000 | 428 000 | 484 000 | 106 2 | 93 9 |
| Mangolds | [illegible]60 000 | 300 000 | 405 000 | 86 5 | 64 2 |
| Fodder turnip | 24 [illegible] | 2[illegible] [illegible]00 | 40 000 | 105 3 | 61 7 |

*Finland* According to the most recent estimate area cultivated to artificially sown meadows is about [illegible]85 [illegible]00 acres against [illegible]90 000 in 1940 percentage 99 The corresponding production of hay is estimated at about 4 130 000 centals ([illegible] [illegible]06 000 short tons against [illegible] 687 000 (1 884 000) percentage 111 8

According to the most recent estimate area cultivated to permanent meadows for hay this year is about 541 000 acres against 741 300 in 1940 percentage 73 0 The corresponding production of hay is estimated at about 4 [illegible]55 000 centals (21[illegible] 000 short tons) against 3 9[illegible]0 000 (200 000) percentage 106 6

*France* According to unofficial press reports the forage crop production is below normal A compensation will be found in the good state of pastures

*Hungary* The second crop of natural meadows has been good In many places fine pastures were obtained after the second cut At the end of September pastures appeared here and there in a state of good vegetation except in the trans Danubian region where rain was needed

*Romania* About the middle of September pastures and stubble fields furnished sufficient nourishment for cattle In view of the zootechnical readjustment the Government has organized a model communal pasture for each agricultural section under the direction of the head of the agricultural section itself

The creation on pastures of artificial meadows of a limited area is also strongly encouraged

*Slovakia* The area under mangels in 1941 is estimated at 60 900 acres against 60,300 acres in 1940 and an average of 61 400 acres in 1938 to 1939, percentages 101 1 and 99 3

*Argentina* Thanks to very favourable weather conditions, pastures improved during the month of September

*United States* According to the October Report the production of Tame hay in 1941 is estimated at 1,713,620,000 centals (85,681,000 short tons) against 1,726,240,000 (86,312,000) in 1940 and an average of 1,489,080,000 (74,454,000) in 1935 to 1939, percentages 99 3 and 115 1

# *LIVESTOCK AND DERIVATIVES*

## PIGS IN DENMARK.

(Thousands of head)

| CLASSIFICATION | 1941 | | | | | | 1940 | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Aug 23 | July 12 | May 30 | April 19 | March 8 | Jan 25 | Dec 13 | Nov 2 | Sept 21 | Aug 10 |
| Boars for breeding | 11 | 11 | 11 | 11 | 11 | 11 | 11 | 13 | 14 | 16 |
| Sows in farrow for first time | 57 | 78 | 74 | 64 | 45 | 32 | 25 | 22 | 23 | 30 |
| Other sows in farrow | 86 | 85 | 87 | 87 | 93 | 100 | 103 | 108 | 120 | 137 |
| Sows in milk | 61 | 53 | 47 | 51 | 45 | 44 | 49 | 60 | 64 | 73 |
| Sows not yet covered (and not for slaughter) | 22 | 17 | 18 | 15 | 17 | 20 | 23 | 32 | 38 | 41 |
| Sows for slaughter | 10 | 7 | 8 | 7 | 11 | 14 | 17 | 23 | 26 | 18 |
| *Total sows* | *236* | *240* | *234* | *224* | *211* | *210* | *217* | *245* | *271* | *299* |
| Sucking pigs not weaned | 515 | 440 | 390 | 429 | 364 | 350 | 401 | 515 | 539 | 617 |
| Young and adult pigs for slaughter | | | | | | | | | | |
| Weaned pigs under 35 kg | 462 | 420 | 432 | 409 | 455 | 523 | 607 | 669 | 755 | 850 |
| Pigs of 35 and under 60 kg | 399 | 405 | 366 | 419 | 473 | 503 | 516 | 600 | 665 | 690 |
| Fat pigs of 60 kg and over | 317 | 254 | 288 | 333 | 359 | 371 | 437 | 486 | 497 | 519 |
| *Total pigs* | *1 940* | *1 770* | *1 721* | *1 825* | *1 873* | *1 968* | *2 189* | *2 528* | *2 741* | *2 991* |

* Rural districts

## CURRENT INFORMATION ON LIVESTOCK AND DERIVATIVES.

*Romania* The Council of Ministers at its meeting of July 8th decided to forbid the slaughter of cattle under two years of age and of cattle of whatever age that were not sure to yield over 52 per cent of meat. The slaughter of pigs under 90 kilos was also forbidden. In order to control slaughtering, the registration of oxen born after the day of publication of the decree was made obligatory (*Monitorul Oficial*, July 10 1941). This last decree and the control of slaughterings may mean a great improvement in the statistics of the amount of cattle.

*Argentina* Sanitary conditions of cattle are good all over the country taken as a whole.

## CURRENT INFORMATION ON SERICULTURE.

*France* After a number of years when production was scarce, sericulture in France has shown this year very satisfactory yields. The production of cocoons is estimated at nearly the same as the average production of the five seasons 1930-34, which amounted to 2,4 million lbs.

*Japan:* Owing to bad weather and to a decrease of mulberry trees in the plantations, the production of summer-autumn cocoons has amounted to only 260 million lbs., as against 362 million lbs. in 1940 and an average 331 million lbs. in the quinquennium 1935-39. Percentages: 72.0 and 78.5.

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## *LATEST INFORMATION*

« *Transnistria* », a region between the Dniester and Bug rivers occupied by the Romanian army, subject to civil Romanian administration, where wheat is the most important culture and of the best quality. Romanian agriculturists estimate that the average yield this year will amount to 11 centals (18 bushels) 13 centals (22 bushels) per acre. No estimate is known regarding area sown to wheat According to official Romanian sources, up to the end of September only 40 per cent. of the wheat crop had been harvested. Beets are scarce Owing to the lack of an agricultural inventory, the problem of Autumn plowing and sowing appears very difficult.

During the week September 28 October 4, fine and rather dry weather was generally favourable to agricultural work. At that time collective farms had been plowed over an area of nearly 740,000 acres. An area of about 670,000 acres had been sown to Autumn cereals.

# TRADE

| COUNTRIES | AUGUST | | | | TWELWE MONTHS (August 1-July 31) | | | | AUGUST | | | | TWELWE MONTHS (August 1-July 31) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | EXPORTS | | IMPORTS | | EXPORTS | | IMPORTS | | EXPORTS | | IMPORTS | | EXPORTS | | IMPORTS | |
| | 1941 | 1940 | 1941 | 1940 | 1940-41 | 1939-40 | 1940-41 | 1939-40 | 1941 | 1940 | 1941 | 1940 | 1940-41 | 1939-40 | 1940-41 | 1939-40 |
| **Wheat.** | | | | | | | | | | | | | | | | |
| | Thousand centals (1 cental 100 lb) | | | | | | | | Thousand bushels of 60 lb. | | | | | | | |
| Sweden | — | — | 0 | 36 | — | — | 277 | 871 | — | — | 0 | 60 | — | — | 461 | 1,451 |
| Romania | 0 | 15 | — | — | 18 | 18 446 | — | — | 0 | 25 | — | — | 30 | 30,743 | — | — |
| United States | 461 | 560 | 1 090 | 356 | 5,376 | 13,496 | 6 870 | 5,813 | 769 | 934 | 1 817 | 593 | 8,960 | 22,493 | 11,450 | 9,688 |
| Argentina | 4,766 | 6 216 | — | — | 56 167 | 104 788 | - | - | 7,942 | 10,359 | — | — | 93,610 | 174,643 | — | — |
| **Wheat Flour.** | | | | | | | | | | | | | | | | |
| | Thousand centals (1 cental 100 lb). | | | | | | | | Thousand barrels of 196 lb. | | | | | | | |
| Canada | (1) 3,432 | | — | — | (2) 16,399 | 13,293 | - | - | (1) 1,751 | ... | — | — | (2) 8,367 | 6 782 | — | — |
| United States | 988 | 852 | 1 | 18 | 12 691 | 11 759 | 114 | 129 | 504 | 435 | 0 | 9 | 6,475 | 6,000 | 58 | 66 |
| Argentina | 98 | 125 | — | — | 1 022 | 1 951 | — | — | 50 | 64 | — | — | 522 | 995 | — | — |
| **Total Wheat and Flour †).** | | | | | | | | | | | | | | | | |
| | Thousand centals (1 cental 100 lb) | | | | | | | | Thousand bushels of 60 lb. | | | | | | | |
| | NET EXPORTS (*) | | NET IMPORTS (**) | | NET EXPORTS (*) | | NET IMPORTS (**) | | NET EXPORTS (*) | | NET IMPORTS (**) | | NET EXPORTS (*) | | NET IMPORTS (**) | |
| United States | 687 | 1,316 | — | — | 15 275 | 23,190 | — | — | 1,145 | 2,193 | — | — | 25,458 | 38,649 | — | — |
| Argentina | 4,896 | 6,252 | — | — | 57,530 | 107,389 | — | — | 8,161 | 10,419 | — | — | 95,882 | 178,979 | — | — |
| **Rye.** | | | | | | | | | | | | | | | | |
| | Thousand centals (1 cental 100 lb) | | | | | | | | Thousand bushels of 56 lb | | | | | | | |
| | EXPORTS | | IMPORTS | | EXPORTS | | IMPORTS | | EXPORTS | | IMPORTS | | EXPORTS | | IMPORTS | |
| Sweden | — | — | 0 | 61 | — | — | 835 | 525 | — | — | 0 | 109 | — | — | 1,491 | 937 |
| Romania | 0 | 8 | — | — | 21 | 2,198 | — | — | 0 | 15 | — | — | 43 | 3,925 | — | — |
| United States | 1 | 0 | 0 | 0 | 137 | 411 | 803 | 0 | 2 | 0 | 1 | 0 | 244 | 733 | 1,435 | 0 |
| Argentina | 1 | 0 | — | — | 1,002 | 5 714 | — | — | 2 | 0 | — | — | 1,789 | 10,203 | — | — |
| **Barley.** | | | | | | | | | | | | | | | | |
| | Thousand centals (1 centals = 100 lb.). | | | | | | | | Thousand bushels of 48 lb. | | | | | | | |
| United States | 195 | 74 | 0 | 83 | 232 | 1,747 | 564 | 290 | 406 | 154 | 1 | 173 | 483 | 3,639 | 1,175 | 604 |
| Argentina | 263 | 160 | — | — | 2,164 | 8.850 | — | — | 547 | 333 | — | — | 4,509 | 18,439 | — | — |

(*) Excess of exports over imports. — (**) Excess of imports over exports.
(†) Flour reduced to grain on the basis of the coefficient: 1,000 centals of flour = 1,333.333 centals of grain. (Thousand barrels of flour = 4,355.55 bushels of grain).
(1) June — (2) Up to June 30

| COUNTRIES | August: Exports 1941 | August: Exports 1940 | August: Imports 1941 | August: Imports 1940 | Twelve months (August 1-July 31): Exports 1940-41 | Exports 1939-40 | Imports 1940-41 | Imports 1939-40 | August: Exports 1941 | August: Exports 1940 | August: Imports 1941 | August: Imports 1940 | Twelve months (August 1 July 31): Exports 1940-41 | Exports 1939-40 | Imports 1940-41 | Imports 1939-40 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Oats.** | | | | | | | | | | | | | | | | |
| | Thousand centals (1 cental = 100 lb) | | | | | | | | Thousand bushels of 32 lb | | | | | | | |
| Sweden | — | — | 1 | 14 | — | — | 695 | 260 | — | — | 2 | 43 | — | — | 2 172 | 812 |
| United States | 6 | 1 | 88 | 263 | 50 | 65 | 2 995 | 3 635 | 18 | 3 | 274 | 821 | 158 | 202 | 9 360 | 11,340 |
| Argentina | 219 | 38 | . | | 1 549 | 8,284 [1]) | 8 [1]) | 9 | 684 | 119 | | | 4 841 | 25 887 [1]) | 25 [1]) | 28 |
| **Maize.** | | | | | | | | | | | | | | | | |
| | Thousand centals (1 cental = 100 lb) | | | | Ten Months (November 1 August 31) | | | | Thousand bushels of 56 lb | | | | Ten Months (November 1 August 31) | | | |
| Romania | 335 | 1 218 | — | — | 3 291 | 13 272 | — | — | 598 | 2 175 | — | — | 5 876 | 23,699 | — | — |
| United States | 662 | 1 866 | 20 | 44 | 3 504 | 20 205 | 525 | 580 | 1 181 | 3 332 | 36 | 78 | 6 258 | 36 081 | 937 | 1 037 |
| Argentina | 685 | 3 304 | — | — | 9 785 | 43 349 | — | — | 1 223 | 5 900 | — | — | 17 473 | 77 409 | — | — |
| **Rice.** | | | | | | | | | | | | | | | | |
| | Thousand centals (1 cental = 100 lb) | | | | Eight Months (January 1 August 31): 1941 | 1940 | 1941 | 1940 | Thousand bushels of 45 lb | | | | Eight Months (January 1 August 31): 1941 | 1940 | 1941 | 1940 |
| United States | 278 | 192 | 23 | 52 | 2 867 | 2 183 | 123 | 291 | 617 | 427 | 52 | 116 | 6 371 | 4 850 | 274 | 648 |
| Argentina | 0 | 2 | | | 11 | 4 [1]) | 42 [1]) | 82 | 0 | 3 | | | 25 | 9 [1]) | 93 [1]) | 182 |
| Burma a) | | | — | — | [2]) 195 | [2]) 353 | — | — | | | — | — | [2]) 434 | [2]) 785 | | — |
| Burma b) | | | — | — | [2]) 22206 | [2]) 19 102 | — | — | | | — | — | [2]) 49345 | [2]) 43449 | — | — |
| **Linseed.** | | | | | | | | | | | | | | | | |
| | Thousand centals (1 cental = 100 lb) | | | | | | | | Thousand bushels of 56 lb | | | | | | | |
| United States | — | — | 638 | 352 | — | — | 5 325 | 5 172 | — | — | 1 139 | 628 | — | — | 9 509 | 9 235 |
| Argentina | 1 467 | 256 | — | — | 7 773 | 13 977 | — | — | 2 620 | 457 | — | — | 13 881 | 24 960 | — | — |
| **Cotton.** | | | | | | | | | | | | | | | | |
| | Thousand centals (1 cental = 100 lb) | | | | Twelve months (August 1 July 31): 1940-41 | 1939-40 | 1940-41 | 1939-40 | Thousand bales of 478 lb | | | | Twelve months (August 1 July 31): 1940-41 | 1939-40 | 1940-41 | 1939-40 |
| United States | 407 | 346 | 216 | 51 | 5,861 | 32 535 | 965 | 841 | 85 | 72 | 45 | 11 | 1 226 | 6 806 | 202 | 176 |
| Argentina | 0 | 41 | | | 664 | 573 [1]) | 13 [1]) | 6 | 0 | 9 | | | 139 | 120 [1]) | 3 [1]) | 1 |
| Peru | | | — | — | 1 573 | 1 547 | | | | | — | — | 329 | 324 | | . |
| | Thousand lb. | | | | | | | | | | | | | | | |
| | **Wool.** | | | | Twelve months (September 1 August 31): 1940-41 | 1939-40 | 1940-41 | 1939-40 | **Butter.** | | | | Eight months (January 1 August 31): 1941 | 1940 | 1941 | 1940 |
| Denmark | — | — | — | — | — | — | — | — | 9,259 | 12 566 | — | — | 91 713 | 190 401 | — | — |
| United States | 0 | 2 | 63,013 | 16,100 | 4 | 485 | 773 444 | 312,286 | 337 | 306 | 271 | 137 | 1 889 | 1 850 | 1 455 | 811 |
| Argentina c) | 9,597 | 7,412 | — | — | 313 792 | 203 018 | — | — | 412 | 875 | — | — | 24 729 | 18 988 | — | — |
| Argentina d) | 7 701 | 3 435 | — | — | 91 935 | 71,966 | — | — | | | | | | | | |

a) Rice in the husk — b) Rice not in the husk — c) Unwashed wool — d) Washed wool

1) Up to June 30. — 2) Up to March 30.

Iousand lb

| COUNTRIES | Cheese. August Exports 1941 | 1940 | August Imports 1941 | 1940 | Eight months (January 1 August 31) Exports 1941 | 1940 | Imports 1941 | 1940 | Cacao. August Exports 1941 | 1940 | August Imports 1941 | 1940 | Eleven months (October 1 August 31) Exports 1940-41 | 1939-40 | Imports 1940-41 | 1939-40 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| United States | 6,252 | 194 | 1 757 | 1,378 | 41 751 | 1 327 | 15 031 | 24 661 | — | — | 3 772 | 79 287 | — | — | 723 394 | 609 781 |
| Equador | — | — | — | — | — | — | — | — | 1) 2 180 | 1) 1 554 | — | — | | 3)17 481 | — | — |
| Argentina | 2,233 | 873 | — | — | 19 919 | 5 044 | — | — | — | — | | | — | — | 3) 8 243 | 3) 7 49[illegible] |

| COUNTRIES | Tea. August Exports 1941 | 1940 | August Imports 1941 | 1940 | Two months (July 1 August 31) Exports 1941 | 1940 | Imports 1941 | 1940 | Coffee. August Exports 1941 | 1940 | August Imports 1941 | 1940 | Two months (July 1 August 31) Exports 1941 | 1940 | Imports 1941 | 1940 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| United States | — | — | 7 767 | 7 176 | — | — | 18 446 | 14 493 | 602 | 1 351 | 58 643 | 151 577 | 851 | 1 951 | 136 667 | 335,520 |
| Nicaragua | — | — | — | — | — | — | — | — | 1) 412 | 1) 1 213 | — | — | | | — | — |
| Salvador | — | — | — | — | — | — | — | — | 1) 4 478 | 1)14 632 | — | — | | | — | — |
| Argentina | — | — | | | — | — | | 1) 3 411 | — | — | | | — | — | | 4)63063 |
| Ecuador | — | — | — | — | — | — | — | — | 1) 1 587 | 1) 1 351 | — | — | | | — | — |
| Netherlands Indies | — | — | — | — | — | — | — | - | ) 6 131 | ) 9 749 | — | — | | | — | — |

1) July — 2) Up to July 31 — 3) Up to June 30 — 4) From July 1 1940 up to June 30 1941 5) April

# STOCKS

## Stocks of cereals in farmers' hands in the United States.

| Products | 1941 | 1940 | 1939 | 1938 | 1941 | 1940 | 1939 | 1938 | 1941 | 1940 | 1939 | 1938 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Percentage of total production | | | | Thousand centals | | | | Thousand bushels | | | |
| Wheat | 51 2 | 45 2 | 44 5 | 43 1 | 295,394 | 221,668 | 200,530 | 240 286 | 492,324 | 369 447 | 334,217 | 108,994 |
| Oats | 81 0 | 83 1 | 81.5 | 81 1 | 295,175 | 328 465 | 244,002 | 273,383 | 922,423 | 1,026,452 | 762,506 | 124,005 |
| Maize | 19 0 | 23.2 | 24 1 | 15 0 | 260,746 | 307,230 | 311,134 | 197,789 | 465,318 | 548 625 | 555,596 | 89,715 |

[1]) Data based on maize for grain of the old crop

## Commercial cereals in store in Canada and the United States.

| Products and location | Oct 1941 | Sept 1941 | Aug 1941 | Oct 1940 | Oct 1939 | Oct 1941 | Sept 1941 | Aug 1941 | Oct 1940 | Oct 1939 |
|---|---|---|---|---|---|---|---|---|---|---|
| | Friday or Saturday nearest 1st of month ([1]) | | | | | | | | | |
| | thousand centals | | | | | thousand bushels | | | | |
| **Wheat** | | | | | | | | | | |
| Canadian in Canada | ... | 262,853 | 259,502 | 224 108 | 164,905 | .. | 438,088 | 423,504 | 373,513 | 274 841 |
| U. S in Canada | . | 123 | 0 | 469 | 824 | . | 205 | 0 | 782 | 1,374 |
| U. S in the United States ([2]) | 169,653 | 164,760 | 148,021 | 111,158 | 97,227 | 282,755 | 274 600 | 246,702 | 185,263 | 162,045 |
| Canadian in the United States | 1,629 | 15,489 | 17,897 | 20,401 | 6,886 | 2,715 | 25,815 | 29,829 | 34,002 | 11,477 |
| Total | .. | *443 225* | *425,420* | *356,136* | *269,842* | .. | *738,708* | *709,035* | *593,560* | ***449,737*** |
| **Rye:** | | | | | | | | | | |
| Canadian in Canada | .. | 1 116 | 759 | 1,538 | 1,234 | . | 1,993 | 1 356 | 2,746 | 2,204 |
| U. S in Canada | .. | 13 | 13 | 15 | 13 | | 24 | 24 | 24 | 24 |
| U S in the United States ([2]) | 9,516 | 8,197 | 6 203 | 4,765 | 5,494 | 16,993 | 14,637 | 11,077 | 8,509 | 9,811 |
| Canadian in the United States | 844 | 646 | 665 | 1,873 | 794 | 1,508 | 1,154 | 1,188 | 3,345 | 1,418 |
| Total | ... | *9,972* | *7 640* | *8,189* | *7,535* | ... | *17,808* | *13,645* | *14,624* | ***13,457*** |
| **Barley** | | | | | | | | | | |
| Canadian in Canada | .. | 3,315 | 1,830 | 2,933 | 4,848 | . | 6,907 | 3 812 | 6,110 | 10,100 |
| U. S. in Canada | ... | 0 | 0 | 0 | 2 | ... | 0 | 0 | 0 | 4 |
| U. S. in the United States ([2]) | 2 989 | 2,647 | 2,627 | 5,356 | 9,187 | 6,228 | 5,514 | 5,471 | 11,158 | 19,139 |
| Canadian in the United States | 23 | 42 | 96 | 414 | 492 | 47 | 87 | 200 | 863 | 1,024 |
| Total | ... | *6,004* | *4 553* | *8,703* | *14,529* | ... | *12,508* | *9,483* | *18,131* | ***30,267*** |
| **Oats:** | | | | | | | | | | |
| Canadian in Canada | ... | 1,209 | 1,343 | 1,763 | 3,274 | ... | 3,777 | 4,197 | 5,508 | 10,230 |
| U. S in Canada | ... | 17 | 20 | 16 | 51 | .. | 52 | 63 | 49 | 160 |
| U. S. in the United States | 4,218 | 3 767 | 2,345 | 2,671 | 5,149 | 13,182 | 11,771 | 7,328 | 8,348 | 16,091 |
| Canadian in the United States | 43 | 139 | 117 | 176 | 7 | 135 | 434 | 366 | 549 | 22 |
| Total | ... | *5,132* | *3,825* | *4,626* | *8,481* | ... | *16,034* | *11,954* | *14,454* | ***26,503*** |
| **Maize:** | | | | | | | | | | |
| U. S. in Canada | ... | 1,447 | 1,385 | 1,721 | 2,075 | ... | 2,584 | 2,474 | 3,074 | 3,705 |
| Argentine in Canada | ... | ... | ... | ... | 2 | ... | ... | ... | ... | 4 |
| South African in Canada | ... | ... | ... | ... | 852 | ... | .. | ... | .. | 1,521 |
| Australian in Canada | ... | ... | .. | ... | 0 | ... | ... | ... | ... | 0 |
| U S. in the United States ([2]) | 21,956 | 22,450 | 24,473 | 25,148 | 8,305 | 39,207 | 40,090 | 43,701 | 44,907 | 14,830 |
| Total | ... | ... | .. | ... | *11,234* | .. | .. | ... | .. | ***20,060*** |

([1]) Friday for Canada, Saturday for the United States. — ([2]) As from August 1941, including 4 central and southwestern markets not reported previously.

## Commercial cereals and oilseeds in store in Argentina ([1]).

| Products and location | First day of month | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Sept 1941 | August 1941 | July 1941 | Sept 1940 | Sept 1939 | Sept 1941 | August 1941 | July 1941 | Sept 1940 | Sept 1939 |
| | thousand centals | | | | | thousand bushels | | | | |
| Wheat in the ports | 41,502 | 40,524 | 37,318 | 10 857 | ([2]) | 69,169 | 67,539 | 62,196 | 18,094 | ([2]) |
| Wheat in other positions | 49,007 | 55 500 | 64,768 | 15 096 | ([2]) | 81,676 | 92,497 | 107,945 | 25,160 | ([2]) |
| Total | *90,509* | *96 024* | *102,086* | *25,953* | ([2]) | *150,845* | *160,036* | *170,141* | *43,254* | ([2]) |
| Rye | 3,684 | 3,706 | 3,737 | 4,679 | 1,164 | 6,578 | 6 618 | 6,673 | 8 355 | 2,079 |
| Barley | 12 011 | 13,517 | 14,772 | 4 538 | 1 219 | 25,023 | 28 161 | 30,777 | 9,453 | 2,539 |
| Oats | 1 603 | 1,890 | 2,280 | 3 155 | 2 857 | 5,009 | 5,906 | 7 125 | 9 860 | 8 928 |
| Maize in the ports | 1,786 | 1 898 | 2 038 | 5 277 | 5,628 | 3 189 | 3,390 | 3,639 | 9 423 | 10 049 |
| Maize in other positions | 2 718 | 2 363 | 2 027 | 10 783 | 9 257 | 4,854 | 4 220 | 3,620 | 19,255 | 16,530 |
| Total | *4 504* | *4 261* | *4 065* | *16 060* | *14,884* | *8 043* | *7 610* | *7 259* | *28,678* | *26,579* |
| Canaryseed | 448 | 486 | 497 | 512 | 331 | 799 | 869 | 887 | 914 | 592 |
| Linseed in the ports | 11 748 | 11 606 | 9 847 | 3 145 | 2 145 | 20 979 | 20 724 | 17 584 | 5 562 | 3,831 |
| Linseed in other positions | 14 687 | 16 325 | 18 215 | 2 475 | 2 065 | 26,227 | 29 152 | 32 527 | 4,420 | 3,687 |
| Total | *26,435* | *27 931* | *28 062* | *5,590* | *4 210* | *47 206* | *49 876* | *50,111* | *9 982* | *7,518* |
| Sunflowerseed | 6,596 | 5 955 | 4 723 | 2,559 | 1 344 | 23,557 | 21 267 | 16,868 | 9 137 | 4,800 |

([1]) In the data for July 1941 and more recent months stocks the property of the "Junta Reguladora de Granos" in the hands of merchants or industrialists are included for wheat rye linseed and sunflowerseed — ([2]) Figures for wheat in store have been withheld by Governmental order

## Cotton stocks on hand in the United States.

| Location | Last day of month | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Sept 1941 | August 1941 | July 1941 | Sept 1940 | Sept 1939 | Sept 1941 | August 1941 | July 1941 | Sept 1940 | Sept 1939 |
| | thousand centals | | | | | thousand running bales (counting round as half bales) | | | | |
| In consuming establishments . | 8 037 | 8 339 | 9,209 | 3,873 | 4,274 | 1,636 | 1 697 | 1,874 | 789 | 870 |
| In public storage and at compresses . . . | 56,688 | 45 732 | 47,735 | 52,826 | 69 742 | 11,524 | 9 297 | 9,704 | 10,738 | 14,176 |
| Total . | *64,725* | *54 071* | *56,944* | *56,699* | *74,016* | *13,160* | *10,994* | *11,578* | *11,527* | *15,046* |

# PRICES BY PRODUCTS.

## A) — Spot quotations. (1)

| DESCRIPTION | Oct 10 1941 | Oct 3 1941 | Sept 26 1941 | Sept 19 1941 | Monthly averages: Sept 1941 | Monthly averages: Oct 1940 | Monthly averages: Oct 193[illegible] | Yearly averages: 1940-41 (2) | Yearly averages: 1939-40 (2) |
|---|---|---|---|---|---|---|---|---|---|
| **Wheat** | | | | | | | | | |
| Chicago No 2 Hard Winter (cents p 60 lb) | | | | 116 /8 | (1) | 85 /8 | 87 1/2 | 90 3/4 | 92 7/8 |
| Minneapolis (cents per 60 lb) | | | | | | | | | |
| No 1 Northern | 103 /8 | 108 /8 | 109 /8 | 110 5/8 | 111 | 82 1/4 | 86 1/4 | 87 1/8 | 91 1/8 |
| No 2 Amber Durum | 102 1/4 | 103 /8 | 104 /4 | 102 1/8 | 104 5/8 | 73 /8 | 78 /8 | 79 3/8 | 80 3/4 |
| New York (cents p 60 lb) | | | | | | | | | |
| No 1 Manitoba Northern (c i f) | 91 | 93 5/8 | 89 1/8 | 88 3/4 | 89 3/8 | 92 /8 | 82 /8 | 88 1/4 | 92 1/4 |
| No 2 Hard Winter (f o b) | 135 1/2 | 137 /4 | 137 /8 | 134 3/4 | 136 /8 | 104 /8 | 107 | 106 1/2 | 112 1/4 |
| Buenos Aires (a) No 2 Hard, 78 kg per hl (paper pesos p 100 kg) | 6 90 | 6 95 | 6 92 | 6 80 | 6 88 | 6 18 | 6 30 | 6 92 | 7 66 |
| **Rye** | | | | | | | | | |
| Minneapolis No [illegible] rye (cents p 56 lb) | 63 /4 | 67 1/4 | 67 | 69 | 68 /8 | 47 | 5[illegible] | 50 7/8 | 56 1/8 |
| New York No [illegible] (c i f cents p 56 lb) | 86 | 89 | 89 7/8 | 89 1/2 | 92 1/4 | 67 /8 | 73 | 63 7/8 | 77 5/8 |
| **Barley** | | | | | | | | | |
| Chicago Feeding (on sample cents p 48 lb) | | | | n q | (1) | 42 1/4 | 39 1 | 46 5/8 | 42 1/8 |
| Minneapolis No 2 Feeding (cents p 48 lb) | n q | n q | n q | n q | n q | 39 1/2 | 43 1/4 | * 41 1/4 | 45 |
| New York No 2 (cents p 48 lb) | 70 1/8 | 75 1 | 76 1/4 | 74 1/2 | 77 1/8 | 62 | 60 3/4 | 65 1/8 | 62 5/8 |
| **Oats** | | | | | | | | | |
| Chicago No 2 White (cents per 32 lb) | | | | 47 /8 | (1) | 34 /8 | 35 3/4 | 37 1/4 | 39 |
| Buenos Aires (a) No 2 White 49 kg p hl (paper pesos per 100 kg) | 4 55 | 4 55 | 4 60 | 4 60 | 4 60 | 3 59 | 5 39 | 4 07 | * 5 17 |
| **Maize.** | | | | | | | | | |
| Chicago No 3 Yellow (cents p 56 lb) | | | | 74 /4 | (1) | 65 | 49 | 64 1/2 | 53 1/4 |
| New York No 2 Mixed Western (cents p 56 lb) | 84 1/4 | 89 1/4 | 90 1/2 | 90 3/8 | 91 1/8 | 64 1/2 | 81 /8 | 79 7/8 | 72 3/4 |
| **Linseed.** | | | | | | | | | |
| Buenos Aires (a) No 1 4 % impurities (paper pesos p 100 kg) | 9 95 | 10 10 | 9 95 | 9 85 | 9 86 | 8 84 | 16 50 | * 13 64 | 15 12 |
| London (c i f shipping current or following month £ per long ton) | | | | | | | | | |
| La Plata | 12- 3 9 | 12- 3-9 | 12 7 6 | 12- 5-0 | 12- 4-4 | * 10 10 10 | n q | *14- 2 0 | *12- 2-3 |
| Bombay | 19 10-0 | 19-10 0 | 20 5-0 | 20-10-0 | 20-16-3 | 16-15- 0 | n q | 18-11-9 | *14-10-3 |
| Minneapolis No 1 Northern (cts p 56 lb) | 183 1/2 | 194 1/2 | 199 3/4 | 196 1/2 | 199 | 145 7/8 | 181 1/2 | 178 | 180 |
| **Cotton.** | | | | | | | | | |
| New Orleans Middling (cents p lb) | 16 49 | 16 80 | 16 19 | 16 91 | 16 95 | 9 46 n | 8 93 | 11 06 n | 10 03 |
| New York Middling (cents per lb) | 17 54 | 17 74 | 17 23 | 17 98 | 17 95 | 9 82 n | 9 23 | 11 55 n | 10 34 |

* Indicates that the product was not quoted during part of the period under review — n q = *not quoted* — n = *nominal*
(a) Thursday prices

(1) In relation to Government price fixing, numerous series are omitted from this table, notes concerning them are given on page 413 et seq of the August- and on page 456 et seq of the September issue of the Crop Report — (2) Commercial season August July, except for maize May-April, and for linseed calendar year — (3) For preceding quotations see Table on p 499

## B) — Quotations for future delivery.

| Description | Oct 10, 1941 | Oct 3, 1941 | Sept 26, 1941 | Sept 19, 1941 | Monthly averages: Sept 1941 | Oct 1940 | Oct 1939 | Oct 1938 | Oct 1937 |
|---|---|---|---|---|---|---|---|---|---|
| **Wheat.** | | | | | | | | | |
| Winnipeg (cents p 60 lb) | | | | | | | | | |
| delivery October | 74 1/2 | 77 3/8 | 72 /8 | 72 1/2 | 73 1/4 | 70 1/4 | 70 3/8 | 60 1/2 | 125 |
| „ December | 75 5/8 | 78 3/4 | 74 1/8 | 74 1/8 | 74 7/8 | 71 5/8 | 72 | 60 | 119 3/4 |
| „ May | 79 3/8 | 82 1/2 | 78 5/8 | 78 3/8 | 78 7/8 | 75 7/8 | 76 3/4 | 63 3/8 | 118 5/8 |
| Chicago (cents p 60 lb) | | | | | | | | | |
| delivery September | — | — | — | 117 | * 117 3/4 | — | — | — | — |
| „ December | 118 7/8 | 121 3/8 | 121 /8 | 120 1/4 | 121 5/8 | 84 3/8 | 84 1/8 | 65 1/2 | 100 1/2 |
| „ May | 123 3/4 | 126 1/8 | 126 1/8 | 124 1/4 | 125 7/8 | 83 1/4 | 83 3/8 | 66 3/4 | 100 5/8 |
| July | 124 3/8 | 126 1/2 | 126 5/8 | — | — | 79 1/4 | 81 7/8 | 66 1/8 | 94 3/4 |
| Buenos Aires (paper pesos p 100 kg) | | | | | | | | | |
| delivery October | — | — | 6.77 | 6.77 | 6.78 | 5.95 | — | 6.56 | * 15.47 |
| „ November | 6.85 | 6.84 | 6.83 | 6.79 | 6.82 | 5.98 | 6.36 | 6.40 | * 15.56 |
| „ December | 6.96 | 6.99 | — | — | — | 6.09 | — | — | 12.63 |
| **Rye.** | | | | | | | | | |
| Winnipeg (cents p 56 lb) | | | | | | | | | |
| delivery October | 58 3/8 | 62 5/8 | 62 /8 | 61 1/2 | 61 7/8 | 43 5/8 | 60 1/2 | 41 3/8 | 85 3/8 |
| „ December | 58 1/2 | 62 3/4 | 61 3/4 | 60 1/2 | 61 3/8 | 44 7/8 | 57 1/2 | 41 | 84 7/8 |
| „ May | 60 7/8 | 64 7/8 | 63 5/8 | 62 1/2 | 63 5/8 | 47 5/8 | 58 3/8 | 43 | 86 |
| Chicago (cents p 56 lb) | | | | | | | | | |
| delivery September | — | — | — | 71 1/4 | * 74 3/8 | — | — | — | — |
| „ December | 70 3/8 | 75 | 74 7/8 | 74 3/4 | 76 1/4 | 45 1/8 | 53 3/4 | 43 | 74 3/4 |
| „ May | 76 7/8 | 81 | 80 3/4 | 80 | 82 1/8 | 48 3/4 | 54 3/8 | 44 1/2 | 73 5/8 |
| July | 78 3/8 | 82 7/8 | 82 | — | — | 49 3/8 | 54 1/4 | — | — |
| **Barley.** | | | | | | | | | |
| Winnipeg (cents p 48 lb) | | | | | | | | | |
| delivery October | 57 1/8 | 60 1/2 | 58 1/2 | 54 1/2 | 56 5/8 | 39 7/8 | 42 5/8 | 36 7/8 | 63 1/8 |
| „ December | 56 | 59 1/8 | 57 3/8 | 54 1/8 | 56 1/8 | 39 | 42 3/8 | 35 3/4 | 61 3/8 |
| „ May | 56 | 59 1/4 | 57 | 54 | 56 | 39 3/8 | 43 1/4 | 36 7/8 | 60 1/2 |
| Minneapolis (cents p 48 lb) | | | | | | | | | |
| delivery September | .. | | | | | — | 37 1/4 | — | — |
| „ December | | | | | | 36 3/8 | 39 | 31 3/8 | 46 1/8 |
| **Oats.** | | | | | | | | | |
| Winnipeg (cents p 34 lb) | | | | | | | | | |
| delivery October | 48 1/8 | 47 7/8 | 48 7/8 | 45 5/8 | 48 3/8 | 33 | 32 3/4 | 28 3/8 | 53 1/8 |
| „ December | 46 | 46 1/4 | 46 3/4 | 43 5/8 | 46 1/8 | 30 1/4 | 31 | 27 5/8 | 48 3/4 |
| „ May | 45 | 45 1/8 | 45 1/2 | 42 3/4 | 45 1/4 | 30 | 31 1/8 | 28 7/8 | 47 1/4 |
| Chicago (cents p 32 lb) | | | | | | | | | |
| delivery September | — | — | — | 49 | * 50 3/8 | — | — | — | — |
| „ December | 50 1/8 | 52 | 52 7/8 | 51 1/4 | 52 1/8 | 33 3/8 | 34 1/4 | 25 1/8 | 30 3/8 |
| „ May | 52 7/8 | 54 3/8 | 55 1/8 | 53 3/8 | 54 1/4 | 33 1/4 | 33 7/8 | 26 | 30 5/8 |
| „ July | 52 | 53 5/8 | 54 3/4 | — | — | 31 1/4 | 31 3/4 | 25 1/8 | 29 1/2 |

* Indicates that the product was not quoted during part of the period under review.

| Description | Oct 10, 1941 | Oct 3, 1941 | Sept 26, 1941 | Sept 19, 1941 | Monthly averages: Sept 1941 | Oct 1940 | Oct 1939 | Oct 1938 | Oct 1937 |
|---|---|---|---|---|---|---|---|---|---|
| **Maize.** | | | | | | | | | |
| Chicago (cents p 56 lb) | | | | | | | | | |
| delivery September | — | — | — | 76 1/8 | 78 | — | — | — | — |
| " December | 77 3/8 | 80 /8 | 81 1/2 | 81 7/8 | 82 3/4 | 60 | 49 5/8 | 45 /8 | 59 /8 |
| " May | 83 1/4 | 85 7/8 | 87 1/8 | 87 | 87 7/8 | 61 | 52 3/8 | 48 3/4 | 60 7/8 |
| " July | 85 1/8 | 87 3/4 | 88 3/4 | — | — | 61 1/4 | 53 1/4 | 50 1/4 | 61 5/8 |
| **Linseed.** | | | | | | | | | |
| Winnipeg (cents per 56 lb) | | | | | | | | | |
| delivery October | 157 | 157 | 158 | 156 3/8 | 155 1/4 | — | 167 7/8 | 133 1/8 | 179 1/8 |
| " December | 145 1/2 | 153 1/4 | 156 1/2 | 154 1/2 | 154 /8 | 130 3/8 | 164 3/4 | 129 3/8 | 176 1/4 |
| " May | 145 | 152 | 153 1/8 | 153 1/4 | 154 1/2 | 134 1/4 | 162 1/4 | 131 1/2 | 177 1/2 |
| Duluth (cents p 56 lb) | | | | | | | | | |
| delivery October | | | | | | — | — | 173 | 202 1/4 |
| " December | | | | | | n 146 1/8 | 174 1/4 | 171 1/4 | 202 1/2 |
| Buenos Aires (paper pesos p 100 kg) | | | | | | | | | |
| delivery October | — | — | 10 00 | 9 90 | 10 09 | 8 97 | 16 99 | 13 56 * | 16 23 |
| " November | 10 57 | 10 24 | 10 29 | 10 13 | 10 36 | 9 05 | 16 53 | 13 22 | 16 47 |
| " December | 10 85 | 10 42 | — | — | — | — | — | — | * 16 17 |

* Indicates that the product was not quoted during part of the period under review

## Prices in Chicago (spot quotations)

| Specification | Sept 12 1941 | Sept 5 1941 | August [illegible] 1941 | August [illegible] 1941 | August 15 1941 | Average August 1941 |
|---|---|---|---|---|---|---|
| Wheat No 2 Hard Winter (cts per 60 lb) | n 120 | 117 | 112 3/4 | n 111 | 108 1/2 | 110 3/8 |
| Barley Fodder (on sample cts per 48 lb) | 56 1/2 | 51 | 50 | 48 | 48 | 48 1/8 |
| Oats No 2 White (cts per 32 lb) | 50 5/8 | 47 3/4 | 45 1/2 | 42 3/4 | 38 3/4 | 40 1/4 |
| Maize No 3 Yellow (cts per 56 lb) | 76 1/8 | 76 | 75 7/8 | 74 3/4 | 73 7/8 | 74 1/2 |

# AVERAGE MONTHLY PRICES BY COUNTRIES.(1)

## GERMANY (Prices in Reichsmarks per quintal)

| Groups | Description | Sept 1941 | August 1941 | July 1941 | April June 1941 | July Sept 1940 | July Sept 1939 | Agricultural year (2) 1940 41 | Agricultural year (2) 1939 40 |
|---|---|---|---|---|---|---|---|---|---|
| A I | †Wheat (Berlin) | 20.40 | 20.40 | 19.40 | 21.40 | 19.60 | 19.60 | 20.50 | 20.50 |
| | †Rye (Berlin) | 18.70 | 18.70 | 17.70 | 19.70 | 17.90 | 17.90 | 18.80 | 18.80 |
| | †Barley feeding (Berlin) | 16.60 | 16.40 | 16.20 | 17.90 | 16.40 | 16.40 | 17.22 | 17.22 |
| | †Oats (Berlin) | 17.90 | 17.95 | 18.10 | 18.70 | 17.93 | 17.46 | 18.28 | 17.65 |
| | †Potatoes red (Berlin) | 5.24 | (10) 8.02 | (10) 11.48 | 5.43 | 7.07 | 6.68 | * 5.07 | * 4.90 |
| | Hops (Nurnberg) | 460.00 | 440.00 | 440.00 | 446.67 | 454.67 | * 450.00 | 451.15 | * 457.60 |
| A II | †Oxen live weight (Berlin) | 88.80 | 91.20 | 91.60 | 88.93 | 88.47 | 88.33 | 81.17 | 87.20 |
| | Calves live weight (Berlin) | 94.20 | 94.80 | 95.40 | 91.27 | 95.40 | 95.40 | 95.12 | 95.25 |
| | †Pigs 220 265 lb live weight (Berlin) | 115.00 | 116.20 | 117.00 | 109.20 | 109.73 | 105.40 | 106.98 | 104.70 |
| | Milk fresh (Berlin) per hectolitre | 19.10 | 19.10 | 19.10 | 19.10 | 19.06 | 16.62 | 19.09 | * 17.74 |
| | †Butter, National Mark | 313.00 | 313.00 | 313.00 | 313.00 | 313.00 | 274.00 | 313.00 | 286.00 |
| | Creamery butter | 297.00 | 297.00 | 297.00 | 297.00 | 297.00 | 260.00 | 297.00 | 271.33 |
| | †Cheese Emmenthal type (Kempten) | 186.75 | 186.75 | 186.75 | 186.75 | 186.75 | 165.00 | 186.75 | [illegible] |
| | Soft cheese 20 % butterfat (Kempten) | 65.25 | 65.25 | 65.25 | 65.25 | 65.25 | 58.00 | 65.25 | 60.36 |
| | †Eggs, aver size, marked "G I B" (Berlin) per 100 | 10.50 | 10.50 | 10.50 | 10.50 | 10.50 | 10.50 | 10.88 | 0.88 |
| B I | †Basic slag, 16 % (Aachen) (3) | 0.220 | 0.220 | 0.220 | 0.211 | 0.192 | 0.220 | 0.208 | 0.200 |
| | †Superphosphate of lime 18 % (3 4) | 0.314 | 0.314 | 0.303 | 0.309 | 0.310 | 0.310 | 0.309 | 0.309 |
| | †Potash salts 40 % (4) | 4.91 | 4.83 | 4.75 | 5.06 | 4.83 | 4.97 | 5.05 | 5.06 |
| | †Sulphate of ammonia, 21% (3-4) | 0.435 | 0.450 | 0.415 | 0.457 | 0.425 | 0.420 | 0.454 | 0.451 |
| B II | Wheat bran (Hamburg) | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 11.70 | 12.00 |
| | Rye bran (Hamburg) | 10.75 | 10.75 | 10.75 | 10.75 | 10.75 | 10.75 | 10.45 | 10.75 |
| | Oaten pods (Northern Germany) | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 |
| | Potato flakes (Hamburg) | 16.70 | 17.70 | 17.70 | 17.70 | 15.90 | 16.23 | 16.80 | 16.88 |
| | Dried sugarbeet residue | 13.07 | 12.93 | 12.79 | 12.51 | 12.93 | 12.87 | 12.33 | 12.32 |
| | Rapeseed cake meal | 14.22 | 14.22 | 14.22 | 14.22 | 14.22 | — | 14.22 | — |

## BELGIUM (Prices in Belgian francs per quintal)

| Groups | Description | Sept 1941 | August 1941 | July 1941 | April June 1941 | July Sept 1940 | July Sept 1939 | Agricultural year (2) 1940 41 | Agricultural year (2) 1939 40 |
|---|---|---|---|---|---|---|---|---|---|
| A I | Wheat (Antwerpen) (6) | 220.00 | 220.00 | 170.00 | 170.00 | * 170.00 | 124.00 | 173.10 | * 141.35 |
| | Rye (Antwerpen) (6) | 210.00 | 210.00 | 155.00 | 155.00 | * 155.00 | n q | 158.05 | * 128.80 |
| | Barley (Antwerpen) (5) | 185.00 | 185.00 | 150.00 | 150.00 | * 150.00 | n q | * 150.00 | * 158.40 |
| | Oats (Antwerpen) (6) | 180.00 | 180.00 | 145.00 | 145.00 | * 145.00 | 79.30 | * 145.00 | * 101.85 |
| | †Potatoes (Leuven) (6) | 75.00 | (10) 110.00 | (10) 186.25 | 80.65 | | 33.15 | * 71.40 | * [illegible] |
| | †Flax fibre (Gent) (7) | n 2300.00 | n 2300.00 | n 2300.00 | 2 300.00 | n q | 1,686.00 | * 2 300.00 | * [illegible] |
| A II | Oxen live weight (Curegem Anderlecht) (8) | 1 100.00 | 1 100.00 | 1 100.00 | 1,100.00 | | 507.35 | * 980.00 | * [illegible] |
| | Calves live weight (Curegem Anderlecht) (8) | 1 200.00 | 1 200.00 | 1 200.00 | 1,200.00 | | 632.35 | * 1 050.00 | * [illegible] |
| | Pigs 220 265 lb live weight (Curegem Anderlecht) (8) | 1 200.00 | 1 200.00 | 1 200.00 | 1 200.00 | | 691.35 | * 1 140.00 | * [illegible] |
| | †Butter (Antwerpen) (9) | 2 900.00 | 2 900.00 | 2 900.00 | 3 033.35 | * 3 100.00 | 1 906.65 | * 3 082.00 | * [illegible] |
| | †Eggs (Antwerpen) per 100 | 135.00 | 135.00 | 135.00 | 110.00 | | 58.70 | * 110.00 | * [illegible] |
| B II | Meadow hay | 56.00 | 56.00 | 56.00 | 56.00 | | | | |
| | Clover hay | 70.00 | 70.00 | 70.00 | 70.00 | | | | |
| | Wheaten straw | 35.00 | 35.00 | 35.00 | 35.00 | | | | |

* Indicates that the product was not quoted during part of the period under review — n q = not quoted — n = nominal.

† Indicates that the series is published in the *International Yearbook of Agricultural Statistics*

(1) Prices of plant (A I) and animal (A II) products sold by the farmer also of fertilizers (B I) and concentrated feeding stuffs (B II) bought by the farmer In cases where the market is not indicated the price is the average for the whole country — (2) July to June — (3) Price per kg of active fertilizer contained in 100 kg of commercial fertilizer — (4) Free at buyer's station — (5) As from Aug 1940 maximum price to producers free at point of delivery — (6) As from Sept 1940 fixed price to producers for average quality — (7) As from Jan 1941 fixed price for best quality of blue flax fiber — (8) As from Sept 1940 maximum price — (9) As from Aug 1940 fixed price at creamery to be paid by wholesalers — (10) Price for early potatoes

## DENMARK (Prices in Danish crowns per quintal)

| Groups | Description | Sept 1941 | August 1941 | July 1941 | April-June 1941 | July-Sept 1940 | July-Sept 1939 | Agricultural year 1940-41 | Agricultural year 1939-40 |
|---|---|---|---|---|---|---|---|---|---|
| A I | Wheat (København) (1) | 28 00 | 28 00 | 28 00 | 28 00 | 21 97 | 16 33 * | 26 49 * | 17 98 |
| | Rye (1) | 29 00 | 29 00 | 29 00 | 29 00 | 22 96 | 16 41 | 27 49 | 18 93 |
| | Barley (København) (1) | 25 00 | 25 00 | 25 00 | 25 00 | 20 30 | 13 49 | 23 82 * | 16 18 |
| | Oats (København) (1) | 25 00 | 25 00 | 25 00 | 25 00 | 20 30 | 14 40 | 23 82 * | 16 72 |
| A II | †Cows, live weight (København) | 111 87 | 118 12 | 111 10 | 101 21 | 62 83 | 51 30 | 83 83 | 50 99 |
| | †Pork, dead weight | 236 00 | 236 00 | 236 00 | 236 00 | 189 33 | 173 47 | 219 90 | 180 23 |
| | Fresh milk | 23 46 | 23 46 | 23 46 | 23 46 | 18 76 | 14 03 | 22 18 | 15 57 |
| | †Butter (København) | 389 00 | 389 00 | 389 00 | 389 00 | 335 25 | 229 98 | 374 56 | 252 76 |
| | Whole milk cheese 45 % (Odense) (2) | 180 00 | 180 00 | 180 00 | 180 00 | 191 92 | 132 08 | 198 89 | 152 31 |
| | †Eggs, for export | 211 00 | 215 00 | 190 40 | 181 0 | 158 53 | 112 37 | 173 57 | 122 33 |
| B I | †Superphosphate 18 % | | 15 50 | 15 25 | 15 25 | 11 02 | 6 47 * | 13 19 | 7 95 |
| | Potash salts 40 % | | 19 85 | 19 85 | 19 85 | 17 27 | 13 12 * | 18 45 | 16 15 |
| | †Sulphate of ammonia 20.8 % | | 23 65 | 23 65 | 23 65 | 18 60 | 16 20 * | 21 57 | 17 70 |
| | †Nitrate of lime 15 1/2 % | | 23 40 | 23 40 | 23 40 | 18 55 | 16 15 * | 21 43 | 17 65 |
| B II | Wheat bran, Danish | n q | n q | n q | n q * | 23 25 | 11 42 * | 23 62 * | 16 82 |
| | Buttermilk powder | n q | n q | n q | n q | 98 00 * | 63 00 | 104 11 * | 86 05 |
| | Hay | 33 80 | 33 00 | 32 80 | 32 00 * | 25 00 | 7 50 * | 30 96 * | 10 83 |
| | Oaten straw | 15 80 | 15 00 | 15 00 | 15 00 | 11 00 | 2 81 | 14 41 | 3 41 |

## ITALY (Prices (1) in lire per quintal)

| Groups | Description | Sept 1941 | August 1941 | July 1941 | April-June 1941 | July-Sept 1940 | July-Sept 1939 | Agricultural year 1940-41 | Agricultural year 1939-40 |
|---|---|---|---|---|---|---|---|---|---|
| A I | †Wheat, soft (Milano) (4) | 155 75 | 155 75 | 155 75 | 155 75 | 155 75 | 148 00 | 155 75 | 151 05 |
| | Wheat, hard, red (Catania) (5) | 164 75 | 164 75 | 164 75 | 164 75 | 164 75 | 157 00 | 164 75 | 160 05 |
| | Oats (Milano) (6-7) | 135 00 | 135 00 | 135 00 | 135 00 * | 135 00 | 104 15 * | 135 00 | 131 15 |
| | †Maize (Milano) (6) | 115 30 | 115 30 | 115 30 | 115 30 | 110 15 | n q | 112 75 * | 109 15 |
| | Rice, Vialone (Milano) | 283 30 | 283 30 | 283 30 | 281 65 | 285 30 | 254 00 | 280 75 | 270 30 |
| | Rice, Maratelli (Milano) | 217 90 | 217 90 | 217 90 | 216 25 | 217 90 | 199 00 | 215 35 | 207 65 |
| | †Rice, Originario (Milano) | 186 80 | 186 80 | 186 80 | 185 15 | 186 80 | 168 95 | 184 25 | 176 80 |
| | †Hemp, fibre (6) | 710 00 | 710 00 | 710 00 | 710 00 | 590 00 | 590 00 | 670 00 | 590 00 |
| | †Olive oil, Sopraffino locale (Bari) (5) | 876 25 | 872 25 | 868 25 | 860 25 | 888 25 | 742 00 | 863 65 | — |
| | †Wine, ordinary 14° (Bari) per hectolitre (6 8) | | | | 458 50 | 210 00 | 97 20 | 282 05 | 164 40 |
| A II | †Oxen, live weight, 1st quality (Milano) (6) | 537 50 | n q | * 513 35 | 502 75 | 590 00 | 478 15 | 549 30 | 518 25 |
| | Lambs, dead weight (Roma) (6) | n q | n q | *1 125 00 | 1 125 00 | *1 000 00 | 885 80 | 1 051 15 | 838 30 |
| | Pigs 400 lb and more, live weight (Milano) (6) | 1 080 00 | 1 080 00 | 870 00 | 840 00 | 780 00 | 640 05 | 820 00 | 697 00 |
| | †Cheese, Parmigiano Reggiano (Milano) | 1 805 00 | 1 765 00 | 1 765 00 | 1 712 35 | 1 565 70 | 1 157 50 | *1 592 10 | *1 373 00 |
| | Eggs (Milano) per 100 (6) | 135 00 | 134 75 | 125 25 | 106 40 | 69 25 | 52 05 | 0 50 | 64 40 |
| | Wool « Roma », Vissana » (Roma) (6) | 3 274 00 | 3 274 00 | 3 274 00 | 3 203 00 | 3 141 00 | 2 602 00 | [illegible] | 2 646 90 |
| B I | †Superphosphate of lime 14-16 % (Milano) | 38 20 | 38 20 | 38 20 | 30 20 | 30 15 | 24 75 | 29 90 * | 26 90 |
| | Chloride of potash 50 % (Milano) | 82 60 | 82 60 | 82 60 | 82 60 | 82 55 | 71 50 | 82 60 | 76 55 |
| | †Nitrate of lime, 15-16 % (Milano) | 113 15 | 112 20 | 110 35 | 117 75 | 109 15 | 87 60 | 114 15 * | 100 90 |
| | Sulphate of ammonia 20-21 % (Milano) | 107 00 | 106 05 | 109 15 | 110 20 | 103 35 | 84 35 | 107 15 * | 95 55 |
| | †Cyanamide of calcium, 15-16 % (Milano) | 122 60 | 121 65 | 118 90 | 116 00 | 111 70 | 90 55 | 115 20 * | 102 20 |
| | †Copper sulphate, 98-99 % (Genova) | n q | n q | n q | n q | 233 50 | n q | n q * | 222 70 |
| B II | Wheat-bran (Milano) | 62 85 | 62 85 | 62 85 | 62 85 | 62 85 | 60 00 | 62 85 | 61 10 |
| | Rice bran (Milano) | 83 00 | 83 00 | 83 00 | 83 00 | 83 00 | 80 00 | 83 00 | 81 20 |
| | Linseed cake (Milano) (6 9) | 90 00 | 90 00 | 90 00 | 90 00 | 90 00 | 81 00 | 90 00 | 83 25 |
| | Groundnut cake (Milano) (6 9) | n 75 00 | n 75 00 | n 75 00 | 75 00 | 75 00 | 65 00 | 75 00 | 67 50 |
| | †Rapeseed cake (Milano) (6 9) | 42 00 | 42 00 | 42 00 | 42 00 | 42 00 | 36 00 | 42 00 | 37 50 |

*, † see notes on preceding page

(1) As from Sept 1940 maximum price paid to producers — (2) As from Jan 1941 cheese … fat — (3) If not otherwise indicated these prices include the tax of 2 per cent on sales levied as from Feb … 1941. The prices including supplements paid to producers, were published in the Crop Report of May … p. 25… and of August … 1941. — (4) Selling prices free at mill — (5) Selling prices, free at depot (*ammasso*) — (6) These prices do not include the tax of 2 per cent on sales — (7) As from Sept 1940: price paid to producers — (8) Prices for wine in depot in Barletta — (9) Prices free at factory

## NETHERLANDS (Prices in florins per quintal).

| Groups | Description | Sept. 1941 | August 1941 | July 1941 | Average April-June 1941 | Average July-Sept. 1940 | Average July-Sept. 1939 | Agricultural year 1940-41 | Agricultural year 1939-40 |
|---|---|---|---|---|---|---|---|---|---|
| A I | Wheat (1) | 13.57 | 12.49 | 12.49 | 12.48 | 11.71 | 10.69 | 12 05 | 10.98 |
| | Rye (1-2) | 13.07 | 11.49 | 11.49 | 11.48 | 10.28 | 8.17 | 10.94 | 9.05 |
| | Barley (1-2) | 12.22 | 10.99 | 10.99 | 10.98 | 9.35 | * 8.37 | 10.33 | 8.88 |
| | Oats (1-2) | 9.82 | 9.49 | 9.49 | 9.48 | 8.18 | 7.44 | 8.91 | 7,86 |
| | Peas (1-2) | 15.32 | 13.98 | 13.85 | 13.59 | n. q. | n. q. | * 13.13 | * 10.66 |
| | Flax, fibre (Rotterdam) | n. q. | n. q. | n. q. | n. q. | n. q. | 70.33 | 122.75 | * 85.33 |
| | †Potatoes (Amsterdam) | ... | (7) 5.80 | (7) 6.40 | 6.02 | * 5.45 | 4.09 | 5.80 | * 4.45 |
| A II | †Beef, dead weight (Rotterdam) (3) | 62.00 | 62.00 | 62.00 | 61.33 | 94.67 | 72.67 | 72.42 | 78.92 |
| | †Pigs, live weight (Rotterdam) (3) | 71.00 | 71.00 | 72.00 | 72.00 | 66.00 | 52.00 | 69.00 | 60.50 |
| | Milk, for industrial purposes (4) | 9.10 | 8 50 | 8.50 | 7.37 | 6.21 | ... | 7.12 | ... |
| | Butter, price for home consumption | 230.00 | 230.00 | 230.00 | 195.00 | 155.00 | 130.00 | 183.00 | 151.00 |
| | †Cheese, Edam 40 + (Alkmaar) | 110.00 | 110.50 | 106.00 | 70.50 | 66.97 | 37.10 | 69.28 | 42.18 |
| | Cheese, Gouda 45 + (Gouda) | 123.50 | 123.60 | 123.75 | 82.67 | 78.88 | 51.06 | 81.56 | 57.7[illegible] |
| | †Eggs, for export (Roermond) per 100 (2-5) | 107.00 | 107.00 | 107.00 | 107.00 | * 3.89 | 3.37 | * 107.00 | [illegible] |
| B I | Basic slag, 16 % (Zwolle) | n. q. | n. q. | n. q. | n. q. | * 1 88 | 2 22 | * 1.84 | 2.26 |
| | Superphosphate, 14 % (Zwolle) (6) | 3.90 | 3.90 | 3.50 | * 4.10 | 2.88 | 1.70 | * 4.44 | 2.17 |
| | Kainite, 14 % (Zwolle) | 1.79 | 1.77 | 1.73 | 1.75 | 1.66 | 1.60 | 1.71 | 1.64 |
| | Nitrate of soda, 15 ½ % (Zwolle) | n. q. | n. q. | n q | * 9 95 | 9.80 | 6.23 | * 9.91 | 6.85 |
| | Sulphate of ammonia, 20 % (Zwolle) | 6.85 | 6.80 | 6.35 | 6.32 | 5.93 | 5.35 | 6.18 | 5.54 |
| B II | †Maize (Rotterdam) | 11 85 | 10.86 | 10.86 | 10.75 | 8.28 | 7 62 | 9.51 | 8.14 |
| | †Linseed cake, Dutch (Rotterdam) | 12.25 | n. q. | 12.25 | 12.25 | 8.25 | 8 26 | 10.65 | * 8.51 |
| | Crushed soya extraction residue (Zwijndrecht) | n. q. | n. q. | n. q. | 12.50 | * 7.50 | 7 77 | 11 31 | * 7.94 |
| | Hay (Cappelle a. d. Yssel) | 5.80 | 5.80 | 5.80 | 5.70 | ... | ... | .. | ... |
| | Straw, all sorts | 2 10 | 2.10 | 2.10 | 2.10 | ... | ... | . | ... |

## SWEDEN (Prices in Swedish crowns per quintal)

| Groups | Description | Sept. 1941 | August 1941 | July 1941 | Average April-June 1941 | Average July-Sept. 1940 | Average July-Sept. 1939 | Agricultural year 1940-41 | Agricultural year 1939-40 |
|---|---|---|---|---|---|---|---|---|---|
| A I | Wheat (Stockholm) | 27 00 | 27.00 | 27.00 | n. q. | * 24.60 | * 16.84 | 26.21 | * 19.64 |
| | Rye (Stockholm) | 27.00 | 27.00 | 27.00 | n. q. | * 24.55 | * 16.36 | 26.15 | * 19.59 |
| | Barley | 26.00 | 26.00 | 26.00 | n. q. | * 25.00 | * 13.97 | * 24.42 | * 16.50 |
| | Oats (Stockholm) | 21.50 | 21.50 | 21.50 | n. q. | n. q. | n. q. | * 22.23 | * 16.17 |
| A II | Cows, live weight (Stockholm) | 96.00 | 96.00 | 96.00 | 107.50 | 72.33 | 71.00 | 87.00 | 72.33 |
| | Pigs, live weight (Göteborg) | 148.00 | 148 00 | 148.00 | 146.50 | 124.67 | 102.00 | 136.67 | 104.83 |
| | Butter (Malmo; prices for the home market) | 355.00 | 355 00 | 355.00 | 371.67 | 325.00 | 300.00 | 369.08 | 300.00 |
| | Eggs (Stockholm) | 233.33 | 225.00 | 218.75 | 186.42 | 164.00 | 134.17 | 192.40 | 150.4[illegible] |
| B I | Superphosphate, 20 % | 10.00 | 10.00 | n. q. | 10.10 | 9.80 | 7.20 | 9.95 | 8.62 |
| | Potash salts, 40 % | 15.60 | 15.60 | n. q. | 15.60 | 15.60 | 12.10 | 15.38 | 14.62 |
| | Nitrate of soda, 15 ½ %-16 % | ... | ... | n. q. | 20.75 | 20.75 | 17.25 | 20.75 | 18.07 |
| | Nitrate cyanamide, 15 ½ % | (8) 20.25 | (8) 20.25 | n. q. | 20.75 | 17.05 | 16.35 | 19.67 | 16.81 |
| B II | Wheat-bran | 16.50 | 16.50 | 16.50 | 16.50 | 17.17 | 13.04 | 16.67 | 15.63 |
| | Rye bran | 16.50 | 15.50 | 15.50 | 15.50 | 16.17 | 11.14 | 15.67 | 14.6[illegible] |
| | Weat meal for feed | * 22.00 | 22.00 | 22.00 | 22.00 | — | — | 22.00 | — |
| | Feeding cellulose | 15.62 | 16.50 | 16.50 | 17.75 | — | — | * 17.91 | — |
| | Concentrated feeding mixture 48 % | 25.12 | 23.50 | 23.50 | 23.50 | ... | ... | 23.50 | 23.1[illegible] |

*, †: See notes on page 500.

(1) Fixed prices, free at producer's station. — (2) Before Sept. 1939: prices at the market. — (3) As from Nov. 1940 fixed prices. — (4) Before July 1941: Price at farm in Friesland for milk with 3.3 % butter-fat. — (5) As from Nov. 1940: price per 100 kg. — (6) As from Jan. 1941: superphoshate 17 %. — (7) Price for early potatoes. — (8) Price for nitrate cyanamide, 18 %.

Prof. Ugo Papi, *Segretario generale dell'Istituto, Direttore responsabile.*

PRINTING OFFICE CARLO COLOMBO — ROME, 31, OCTOBER 1941.

# MONTHLY CROP REPORT AND AGRICULTURAL STATISTICS

*The following explanations refer to crop conditions quoted in the crop notes and in the tables. — Crop condition according to the system of the country Germany, Bohemia and Moravia (Protectorate), Hungary* 1 *excellent,* 2 = *good* 3 = *average,* 4 = *poor,* 5 — *very poor, Finland* 8 *very good,* 6 = *above the average,* 5 = *average, France* 100 — *excellent,* 70 — *good,* 60 = *fairly good,* 50 — *average,* 30 — *poor, Romania and Sweden* 5 = *excellent,* 4 — *good,* 3 — *average,* 2 = *poor,* 1 — *very poor, Netherlands* 90 = *excellent,* 70 = *good,* 60 = *fairly good,* 50 = *below awerage, Portugal* 100 = *excellent,* 80 = *good,* 60 = *average,* 40 = *poor,* 20 = *very poor, Switzerland* 100 = *excellent,* 90 = *very good,* 75 — *good,* 60 — *fairly good,* 50 = *average,* 40 — *rather poor,* 30 *poor,* 10 = *very poor U S S R* 5 = *good,* 4 — *above the average,* 3 — *average,* 2 — *below average,* 1 = *poor, Canada* 100 = *crop condition promising a yield equivalent to the average yield of a long series of years, United States* 100 = *crop condition which promises a normal yield Egypt* 100 *crop condition which promises a yield equal to the average yield of the last five years For other countries the system of the Institute is employed* 100 = *crop condition which promises a yield equal to the average of the last ten years*

NOTE *The countries are listed throughout by continents (Europe followed by the U S. S R, America, Asia, Africa and Oceania) in the French alphabetical order In the tables the Northern Hemisphere precedes the Southern Hemisphere*

## *VEGETAL PRODUCTION*

### CURRENT INFORMATION FROM VARIOUS COUNTRIES ON WHEAT, RYE, BARLEY AND OATS.

*Bulgaria* During the first two weeks in October sowings of winter cereals were actively progressing favoured by fine weather Towards the middle of October the temperature fell considerably and it snowed especially in the western part of the country while in the other parts the weather was rainy and damp In the last days of the month it turned fine and warmer Sowings were resumed under the control of agricultural authorities All over the country and in the regions which were recently occupied, orders were given regulating the sowings in the larger area destined to cereal crops

*Croatia* According to unofficial information, the 1941 wheat production is put at 14 3 million centals (17 7 million bushels) harvested on an area of 1,581 000 acres. It is estimated that the bread needs of the country are more than filled

*Finland* During the month of October the temperature varied from 5° above to 23° below zero It rained little and plowing was only possible here and there

*Greece* According to unofficial information from Thessaly, this year cereal crop in the regions of Larissa and Trikkala, which are the most important zones of cereal production in present day Greece, will amount to no more than 1,980,000 centals against 4 4 million centals generally produced in these regions The competent agricultural authorities have taken the necessary measures for the intensification of cereal cultivation during the coming agricultural season

By a decision of the Ministry of Agriculture, the date of delivery of cereals to buying centers has been postponed A premium has been instituted for immediate deliveries

## *Area and Production of Cereals.*

| COUNTRIES | AREA 1941 (000 acres) | AREA 1940 (000 acres) | AREA Aver 1935 to 1939 (000 acres) | AREA % 1941: 1940 = 100 | AREA % 1941: Aver. = 100 | PRODUCTION 1941 (000 centals) | PRODUCTION 1940 (000 centals) | PRODUCTION Aver. 1935 to 1939 (000 centals) | PRODUCTION 1941 (000 bushels) | PRODUCTION 1940 (000 bushels) | PRODUCTION Aver. 1935 to 1939 (000 bushels) | PRODUCTION % 1941: 1940 = 100 | PRODUCTION % 1941: Aver. = 100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **WHEAT** | | | | | | | | | | | | | |
| Belgium | 439 | (w) 354 | 394 | — | 111.4 | ... | ... | 9,691 | .. | ... | 16,151 | ... | ... |
| Denmark | 203 | 199 | 316 | 101.8 | 64 1 | . . | 4,094 | 8,617 | .. | 6,823 | 14,361 | . . | ... |
| Spain | 9,445 | 8,735 | (1)8,639 | 108.1 | 109.3 | 65,377 | 47,648 | 63,270 | 108,959 | 79,412 | (1)105,448 | 137.2 | 103.3 |
| Finland | 326 | 349 | 264 | 93 5 | 123.6 | 3,735 | 3,939 | 4,208 | 6,224 | 6,565 | 7 013 | 94.8 | 88,8 |
| Ireland | 491 | 305 | 225 | 160 9 | 218.4 | ... | 7,011 | 4,613 | ... | 11,685 | 7,689 | ... | ... |
| Italy | . . | 12,566 | 12,639 | ... | ... | 157,631 | 156,754 | 167,713 | 262,713 | 261,251 | 279,517 | 100.6 | 94.0 |
| Netherlands | 339 | 331 | 338 | 102 2 | 100,2 | | | 9,113 | | .. | 15,188 | | |
| Romania | (2)5,807 | (2)5,014 | 9,054 | 115,8 | — | (2)54,124 | (2)30,225 | 84,491 | (2)90,204 | (2)50,375 | 140,816 | 179.1 | — |
| Slovakia | 550 | 533 | (3) 539 | 103.1 | 102.1 | 6,955 | 6,740 | (3) 8,572 | 11,591 | 11,233 | (3)14 287 | 103 2 | 81.1 |
| Sweden | 707 | 763 | 741 | 92.6 | 95.4 | 7,496 | 9,522 | 15,811 | 12,493 | 15,869 | 26,351 | 78.7 | 47.4 |
| Canada | 22,372 | 28,726 | 25,596 | 77.9 | 87.4 | 183,875 | 330,834 | 187,440 | 306,459 | 551,390 | 312,399 | 55.6 | 98 1 |
| Un. St. (w) | 40,316 | 36,147 | 41,186 | 111.5 | 97.9 | 410,980 | 353,491 | 351,467 | 684,966 | 589,151 | 585,778 | 116.3 | 116 9 |
| Un. St. (s) | 16,467 | 17,356 | 16,387 | 94.9 | 100.5 | 165 737 | 136,528 | 105,964 | 276,228 | 227,547 | 176,606 | 121.4 | 156.4 |
| Mexico | 1,347 | 1,450 | 1,251 | 92.9 | 107.6 | 8,257 | 8,002 | 7,391 | 13 828 | 13,337 | 12,318 | 103.7 | 112.3 |
| India (4) | 34,499 | 34,003 | 34,485 | | — | 224,400 | 241,562 | 222,396 | 374,000 | 402 603 | 370,660 | 92.9 | 100.9 |
| Japan | 1,983 | 2,024 | 1,738 | 96 1 | 114 1 | 32,377 | 39,682 | 30,078 | 53,960 | 66,135 | 50,130 | 81.6 | 107 6 |
| Syria and Leb. | 1,600 | ... | 1,363 | ... | 117.4 | 16,560 | 14 760 | 11,692 | 27,600 | 24,600 | 19,486 | 112 2 | 141 6 |
| Algeria | ... | ... | 4,176 | .. | .. | 19,200 | 16,560 | 20,890 | 32,000 | 27,600 | 34,816 | 115.9 | 91 |
| Egypt | 1,561 | 1,563 | 1,464 | 99.9 | 106.7 | 24,918 | 29,997 | 27,510 | 41,529 | 49 994 | 45,848 | 83.1 | 90 |
| Tunisia | 1,322 | 1,359 | 1,884 | 97.3 | 70.2 | 8,819 | 6,393 | 9,019 | 14,697 | 10,655 | 15,031 | 137.9 | 97 |
| Argentina | (5)18,039 | (5)17,569 | (5)18,577 | 102.7 | 97.1 | ... | 162,706 | 131,710 | ... | 271,171 | 219,512 | ... | . . |
| Uruguay | 1,043 | 924 | 1,228 | 112.8 | 84 9 | ... | 4,235 | 7,954 | .. | 7,058 | 13,256 | . . | ... |
| New Zealand | 300 | 240 | 221 | 125.0 | 135.5 | 6,000 | 5,040 | 4,277 | 10,000 | 8,400 | 7,129 | 119 0 | 140 3 |
| **RYE** | | | | | | | | | | | | | |
| Belgium | 310 | 280 | 369 | 110.7 | 84.1 | . . | ... | 7,790 | ... | ... | 13,910 | . . | |
| Denmark | 474 | 339 | 352 | 139.6 | 134.7 | ... | 5,908 | 5,552 | ... | 10,551 | 9,915 | ... | .. |
| Spain | 1,473 | 1,361 | (1)1,302 | 108.2 | 113.1 | 8,754 | 7,740 | (1) 9,041 | 15,632 | 13,821 | (1)16,144 | 113.1 | 96.8 |
| Finland | 473 | 459 | 578 | 103 0 | 81 7 | 5 997 | 4,627 | 7,774 | 10,708 | 8,263 | 13,883 | 129.6 | 77 1 |
| Netherlands | 596 | 563 | 559 | 105,7 | 106,6 | . . | ... | 11,386 | ... | ... | 20,332 | | . |
| Slovakia | 372 | 368 | (3) 380 | 101.1 | 97.8 | 4,409 | 4,403 | (3) 5,259 | 7,874 | 7,862 | (3) 9,391 | 100 2 | 83 8 |
| Sweden | 509 | 422 | 495 | 120.5 | 102.8 | 6,195 | 6,275 | 8,304 | 11,063 | 11,205 | 14,828 | 98.7 | 74 6 |
| Canada | 1,077 | 1,035 | 816 | 104,1 | 131.9 | 7,785 | 7 837 | 5,147 | 13,902 | 13,994 | 9,191 | 99.3 | 151.3 |
| United States | 3,436 | 3,192 | 3,723 | 107.6 | 92.3 | 26,019 | 22,737 | 25,576 | 46,462 | 40,601 | 45,672 | 114.4 | 101.7 |
| Argentina | (5)2,661 | (5)2,751 | (5)2,480 | 96 8 | 107,3 | . . | 4,678 | 5,586 | ... | 8,354 | 9,974 | ... | ... |
| **BARLEY** | | | | | | | | | | | | | |
| Belgium | 74 | 57 | 76 | 130.4 | 98.0 | ... | ... | 1,757 | ... | ... | 3,661 | ... | ... |
| Denmark | 930 | 956 | 939 | 97.2 | 99 0 | ... | 25,104 | 25,191 | ... | 52,301 | 52,483 | ... | ... |
| Spain | 3,886 | 3,859 | (1)3,382 | 100.7 | 114 9 | 37,146 | 30,769 | 31,262 | 77,390 | 64,103 | 65,130 | 120.7 | 118.8 |
| Finland | 325 | 281 | 305 | 115.4 | 106.4 | 3,219 | 3,061 | 4,070 | 6,706 | 6,377 | 8,478 | 105,2 | 79 1 |
| Ireland | 169 | 132 | 118 | 128.0 | 143.2 | ... | 3,114 | 2,598 | ... | 6,487 | 5,413 | ... | ... |
| Slovakia | 489 | 497 | (3) 492 | 98.5 | 99.5 | 5,842 | 6,719 | (3) 6,946 | 12,172 | 13,999 | (3) 14,470 | 86,9 | 84.1 |
| Sweden | 240 | 264 | 252 | 90,8 | 95,1 | 3,461 | 4,173 | 4,777 | 7,211 | 8,694 | 9,952 | 82.9 | 72 5 |
| Canada | 5,449 | 4,341 | 4,291 | 125.5 | 127.0 | 58,261 | 50,043 | 42,663 | 121,378 | 104,256 | 88 882 | 116.4 | 136.6 |
| United States | 13,977 | 13,394 | 10,774 | 104.4 | 129.7 | 168,731 | 148,433 | 113,409 | 351,522 | 309,235 | 236,270 | 113.7 | 148.8 |
| Japan | ... | 1,848 | 1,892 | ... | ... | 36,385 | 37,198 | 35,112 | 75,803 | 77,498 | 73,152 | 97.8 | 103.6 |
| Algeria | ... | ... | 3,058 | ... | ... | 15,360 | 7,920 | 15,415 | 32,000 | 16,500 | 32,114 | 193.9 | 99.6 |
| Egypt | 255 | 268 | 278 | 95.1 | 95.1 | 4,699 | 5,315 | 7,339 | 9,789 | 11,073 | 15,290 | 88.4 | 64.0 |
| Tunisia | ... | ... | 1,174 | ... | ... | 4,400 | 2,000 | 4,564 | 9,186 | 4,134 | 9,508 | 222.2 | 96.6 |
| Argentina | (5)1,972 | (5)2,139 | (5)1,901 | 92.2 | 103.7 | ... | 17,395 | 11,329 | ... | 36,239 | 23,602 | ... | ... |
| Uruguay | 67 | 54 | (6) 36 | 122.7 | — | ... | 216 | (6) 259 | .. | 450 | (6) 539 | ... | ... |
| New Zealand | 30 | 26 | 24 | 115.4 | 125.5 | 550 | 481 | 461 | 1,146 | 1,002 | 961 | 114.4 | 119 2 |

## Area and Production of Cereals

| COUNTRIES | AREA 1941 | 1940 | Aver 1935 to 1939 | % 1941 1940 = 100 | Aver 100 | PRODUCTION 1941 | 1940 | Aver 1935 to 1939 | 1941 | 1940 | Aver 1935 to 1939 | 1941 1940 100 | Aver 100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 000 acres | | | | | 000 centals | | | 000 bushels | | | | |
| **OATS** | | | | | | | | | | | | | |
| Belgium | 413 | | 548 | | 75 4 | | | 14 074 | | | 43 982 | | |
| Denmark | 846 | 843 | 926 | 100 3 | 91 4 | | 19 641 | 22 303 | | 61 378 | 69 697 | | |
| Spain | 1 646 | 1 597 | (1) 1 423 | 103 1 | 115 7 | 12 469 | 10 459 | (1) 10 549 | 38 964 | 32 685 | (1) 32 966 | 119 2 | 118 2 |
| Finland | 1,052 | 1,054 | 1,142 | 99 8 | 92 1 | 12 103 | 11 128 | 15 974 | 37 823 | 34 776 | 49 917 | 108 8 | 75 8 |
| Ireland | 779 | 681 | 571 | 114 4 | 136 5 | | 16 222 | 12 565 | | 50 694 | 39 265 | | |
| Slovakia | 370 | 365 | (3) 333 | 101 5 | 131 3 | | 4 596 | ( ) 3,660 | | 14 363 | (3) 11,437 | | |
| Sweden | 1,549 | 1 569 | 1 641 | 98 7 | 94 4 | 17 106 | 20 660 | 27 904 | 53 455 | 64 563 | 87 199 | 82 8 | 61 5 |
| Canada | 13 841 | 12 298 | 13 246 | 112 6 | 104 5 | 121 705 | 129 379 | 114 944 | 380 327 | 404 309 | 359 201 | 94 1 | 105 9 |
| United States | 37 236 | 34 847 | 35 417 | 106 9 | 105 1 | 364 430 | 395,401 | 329 369 | 1 138 843 | 1 235,628 | 1 029,279 | 92 2 | 110 6 |
| Algeria | | | 470 | . | | 2 560 | | 3 387 | 8 000 | | 10 585 | . | 75 6 |
| Argentina | (6) 3,519 | ( ) 3 899 | (6) 3 547 | 90 2 | 99 2 | | 11,894 | 16 254 | | 37,168 | 50 795 | | |
| Uruguay | 237 | 225 | 213 | 105,5 | 111 2 | | 421 | 992 | | 1 316 | 3 100 | | |
| New Zealand | 60 | 61 | 63 | 98 4 | 95 4 | 1 080 | 1 120 | 1 174 | 3 375 | 3 500 | 3 669 | 96 4 | 92 0 |

(*w*) Winter crop — (*s*) Spring crop — (1) Year 1939 — (2) Not including territories transferred in 1940 (3) Average of two years — (4) Final estimate except for 1941 area the figure of which is that of the fourth estimate (5) Area sown (6) Not including barley for brewery

*Hungary* During the three weeks ending October 25 the weather was favourable to the storing of agricultural products but its influence on plowing and vegetation of seeds was very variable At the end of that period threshing of cereals was over except in the eastern regions of the country The sowing of winter barley was over nearly everywhere Owing to drought the growth of winter barley seeds was irregular but rains fallen towards the end of the period under consideration, improved their condition Two or three more weeks of warm weather were needed Drought retarded the sowing of winter rye which was being done towards the 25th of October At that time the preparation of the soil for the sowing of winter wheat was going on everywhere In most of the regions soil plowing is being done under favourable conditions

During the three weeks ending November 12 the weather was not favourable to sowings of winter cereals At that date, it was estimated that a period of from 10 to 14 warm days was needed to allow the completion of sowings Early seeds are generally sufficiently strong and will be able to stand well the first winter frosts Late seeds however, had hardly begun to burst out at the middle of November and in some places they still needed several warm days Here and there in some of the lowest regions of the Altold plains damages were caused to crops by an excess of soil humidity

*Romania* During the second part of the month of October the weather was very wet and rainy In spite of unfavourable weather, the condition of areas plowed in autumn was satisfactory Farmers had plowed, up to November 1 a greater area than by the corresponding date in 1940 and 1939 Unfortunatly, owing to bad weather and the war, the condition of wheat sowings done up to the middle of November, was not satisfactory Small farms where the plan of sowings had not been entirely

carried out, suffered most. If the weather is favourable, however, sowings can be continued during the whole month of November. Area which may eventually be left unsown to winter cereals, can be sown in the spring, chiefly to maize, spring rye, potatoes and vegetables. By the middle of November, seeds that had been planted early, had regularly sprouted and were developping well. As a precautionary measure the Government is thinking of rationing wheat consumption in the cities.

*Sweden:* During harvest time, weather conditions were unfavourable, cereals matured too quickly, straw is often too short and yields are considerably below normal. (See Cereal Table).

According to the most recent estimate, area cultivated to meslin this year is about 719.000 acres against 702 000 in 1940 and 626.000 on the average of the five years ending 1939; percentages 102.4 and 114.9. The corresponding production is estimated at about 9,462,300 centals (16,314,000 bushels) against 10,541,000 (18,174,600) and 12,557,600 (21,651,200), percentages 89.8 and 75 4

*Argentine:* Drought and frost in the month of October caused some damages to the cereal crops. At the beginning of November the condition of the wheat crop was considered average.

*Canada:* The production of spring wheat in the Prairie Provinces is estimated at 171,600,000 centals (286,000,000 bushels) against 315,000,000 (525,000,000) in 1940 and an average of 174,348,000 (290,579,000) in 1935 to 1939; percentages, 54.5 and 98.4. The corresponding figures for all Canada are: 174,025,000 (290,042,000); 317,575,000 (529,291,000); 177,137,000 (295,229,000); 54.8 and 98.2 per cent.

The production of spring rye in 1941 is estimated at 1,824,000 centals (3,258,000 bushels) against 2,037,000 (3,637,000) in 1940 and an average of 1,120,000 (1,999,000) in 1935 to 1939; percentages, 89.6 and 163 0.

*Uruguay:* After the September drought, rains that fell in October improved the conditions of the cereal crops. According to a telegram from the Government of Uruguay dated November 25, the condition of the wheat crop was considered satisfactory.

## CURRENT INFORMATION ON MAIZE.

*Bulgaria:* Weather conditions during the first two weeks in September and the first decade in October were generally favourable to ripening and harvesting of maize. In the Tirnovo region, harvest was over about the middle of October. In the other most important cereal regions, such as Pavlikeni, Bela-Slatina, Orechovo, etc., harvest was going on in full, favoured by fine weather About October 13-14 the temperature fell considerably and it snowed. This however did not retard to any important extent the ripening of the crop and its harvest, especially as the weather turned warm again and less rainy towards October 15. According to very recent information, harvest operations in many parts of the country were almost over towards the end of October : weather conditions were good. First results show that maize production this year has been very abundant, thus confirming the optimistic forecast made in September.

*Croatia:* According to unofficial information, area destined to the maize crop according to the new plan prepared for Croatian agriculture, has been fixed at 2.7 million acres.

*Greece:* The production of maize in the two provinces of Thessaly, is estimated this year at 330,000 centals (590,000 bushels). This figure is about the same as that of 1938 and twice lower than normal production in that region.

*Hungary:* Towards October 25, the varieties of early maize had been harvested everywhere. At the same date, except for the eastern and northern departments, late varieties were being harvested.

*Romania:* The maize crop this year has been quite abundant but grains show a high degree of humidity. Until it will be possible to provision with the maize of the present season the Capital and the provinces that show a deficit in the production of this crop, the provisioning will be done with maize from Bessarabia.

*Argentina:* In October, plowing and first maize sowings were continued under favourable conditions.

*United States.* A maize crop of 2,675,373,000 bushels (1,498,209,000 centals) is indicated by November 1 prospects This is an increase of about 50 million bushels (17,928,000 centals) over the October 1 estimate. The 1941 crop compares with bushels 2,449,200,000 bushels (1,371,552,000 centals) produced in 1940, an increase of 9 2 per cent, and 2,325,290,000 bushels (1,302,162,000 centals) on the average of the five preceding years, an increase of 15 1 per cent. The indicated production relates to the acreage grown for all purposes, *i. e.* grain, silage, forage, hogging, and grazing The November 1 indicated yield per acre of 31.1 bushels (17 43 centals) is 2.8 bushels (157 lb) above the 1940 yield of 28.3 bushels (15.85 centals) and 7.6 bushels (426 lb.) larger than the 10-year (1930 39) average yield of 23 5 bushels. It is the highest yield in the 75 years of record, and it has more than offset the drastic decline in acreage, maize acreage this year being the smallest since 1894

## CURRENT INFORMATION ON RICE.

*Argentina:* Preparatory work for rice sowing was done under good conditions. In all zones of production an increase of area, as compared with last year, is expected.

*United States:* According to the November Crop Report area cultivated to rice is 1,186,000 acres, against 1,051,000 in 1940 and 1,000,000 on the average of the preceding 5-year period; percentages. 112.8 and 118.6. The corresponding production is estimated at about 24,808,000 centals (55,128,000 bushels) against 23,739,000 (52,754,000) and 22,398,000 (49,774,000), percentages· 104 5 and 110.8.

## CURRENT INFORMATION ON POTATOES.

*Hungary:* Potato pulling and storing were over everywhere by October 25.

*Ireland:* The area under potatoes in 1941 is estimated at 437,500 acres against 366,700 acres in 1940 and an average of 328,200 acres in 1935 to 1939; percentages, 119 3 and 133.3.

*Netherlands:* The area under potatoes in 1941 is estimated at 395,000 acres against 319,000 acres in 1940 and an average of 258,000 acres in 1935 to 1939; percentages, 124.0 and 153.5.

*Romania:* According to the Government's plan, the cultivation of potatoes should be greatly developped in 1941-42. This crop should gradually replace maize in the higher regions where maize often fails to come to a full maturation. In order to improve the quality of potatoes to be sown, the necessary quantities will be imported from Germany.

*Sweden:* The condition of the culture at October 15 was quoted 3.2 according to the system of the country, as against 3.1 at September 1, 1941 and 3.6 at October 1,

1940. Potato pulling was nearly over by the middle of October. it was done under favourable conditions, no malady was recorded and the quality of tubers is good

According to the most recent estimate area cultivated to potatoes this year is about 336,000 acres against 333,000 in 1940 and 325,500 on the average of the five years ending 1939, percentages 100 9 and 103 3 The corresponding production is estimated at about 45,693,000 centals (76,154,000 bushels) against 50,583,000 (84,304,000) and 39,979,000 (66,630,000); percentages 90 3 and 114.3.

*Switzerland*. According to the last estimate area cultivated to potatoes is 146,300 acres, against 122,400 in 1940 and 119,300 on the average of the preceding 5-year period; percentages: 119.5 and 122 7. The corresponding production is estimated at about 20,944,000 centals (34,906,000 bushels) against 19,405,000 (32,341,000) and 15,817,000 (26,362,000); percentages 107.9 and 132.4.

*United States* According to the November Crop Report area cultivated to potatoes is 2,904,300 acres, against 3,052,800 in 1940 and 3,165,800 on the average of the preceding 5-year period, percentages 95.1 and 91 7 The corresponding production is estimated at about 226,021,000 centals (376,701,000 bushels) against 238,633,000 (397,722,000) and 222,110,000 (370,183,000), percentages 94 7 and 101.8

## PRODUCTION OF BEET SUGAR IN THE CURRENT SUGAR SEASON

The harvest of the sugar beet crop in some countries where it had not been completed by the end of October, has now been done under quite favourable weather conditions. Roots have been found to have grown in size and sugar contents increased. This means that probably the production of beet sugar in Europe will be better than had been previously forecast.

A Table is annexed to these notes showing the first estimates on sugar production in a limited number of countries. This year, as always in former years, the Institute had addressed to the different Governments its usual inquiry on sugar production. Unfortunately, owing to present circumstances, official replies were few. The Institute therefore, together with information that reached it directly, is giving now mostly data gathered by the International Association for Sugar Statistics and F. O. Licht. These data on sugar production of European countries appearing in the Table, represent hardly 1/3 of the whole sugar production of Europe, not including the U. S. S. R.

Looking over these first estimates one can see that in the current season as compared with 1940-41 there has been an increase of production in Bulgaria, Denmark and France. This increase, rather than to favourable season conditions must be attributed to an increase of area sown to sugar beet, which was markedly greater than the year before.

In Romania, unit yields appear rather low, especially if the large increase of area sown to sugar beet brought about by the occupation of Bessarabia and Northern Bukovina, is taken into account. The increase of sugar production in Romania was 50 per cent. above that of the year before, which must be attributed more to increased area than to the fact that production in 1940-1941 was very low.

*Production of Beet-Sugar (raw)*

| COUNTRIES | TOTAL PRODUCTION DURING THE SEASON | | | | | | % 1941-42 | |
|---|---|---|---|---|---|---|---|---|
| | 1941-42 (1) | 1940-41 | Average 1935-36 to 1939-40 | 1941-42 (1) | 1940-41 | Average 1935-36 to 1939-40 | 1940-41 = 100 | Average = 100 |
| | thousand centals | | | short tons | | | | |
| Belgium | 5 513 | 5 633 | 5 154 | 280 000 | 281 600 | 257 721 | 98 | 107 |
| Bulgaria | (2) 1 235 | (2) 1 052 | 476 | ( ) 62 000 | ( ) 52 579 | 23 798 | 117 | 259 |
| Croatia | ( ) 419 | (2) 383 | — | ( ) 21 000 | (2) 19 161 | — | 109 | — |
| Denmark | 5 732 | 5 490 | 4 949 | 290 000 | 274 000 | 247 463 | 104 | 116 |
| Finland | 110 | 165 | 257 | 6 000 | 8 233 | 12 836 | 67 | 43 |
| France | (3) 15 310 | (3) 10 377 | 20 513 | (3) 765 486 | (3) 518 857 | 1 025 635 | 148 | 75 |
| Italy | 10 053 | 13 387 | 8 350 | 503 000 | 669 330 | 417 471 | 75 | 120 |
| Latvia | (3) 725 | (3) 1 118 | 979 | (3) 36 300 | (3) 55 913 | 48 970 | 65 | 74 |
| Lithuania | (3) 739 | (3) 729 | 541 | (3) 26 900 | (3) 36 457 | 27 069 | 101 | 136 |
| Romania | (3) 2 822 | 1 881 | 2 798 | (3) 141 000 | 94 031 | 139 891 | 150 | 101 |
| Slovakia | (3) 1 389 | (3) 1 407 | (4) 1 190 | ( ) 69 000 | (3) 70 300 | (4) 60 000 | 99 | 117 |
| Sweden | 6 261 | 6 855 | 6 805 | 313 000 | 342 770 | 340 241 | 91 | 92 |
| Switzerland | (3) 397 | 408 | 251 | (3) 20 000 | 20 400 | 12 536 | 97 | 158 |
| Serbia | (3) 779 | ( ) 2 425 | ( ) 1 913 | (3) 39 928 | (5) 120 000 | ( ) 95 665 | — | |
| United States | (2) 30 600 | 37 758 | 30 409 | ( ) 1 530 000 | 1 887 903 | 1 520 407 | 81 | 101 |
| Japan | 882 | 643 | 949 | 40 000 | 34 657 | 47 451 | 127 | 93 |
| Turkey | 1 984 | 1 955 | 1 509 | 100 000 | 97 740 | 75 468 | 102 | 131 |

(1) Approximate data — (2) Licht's estimate — (3) Data of International Association for Sugar Statistics — (4) Season 1937-38 — (5) Former Yugoslavia

Among the countries that show a marked decrease as compared with last year are Finland and Sweden. In both countries, unfavourable weather conditions and drought told heavily on production. In Latvia the crop was damaged by war, and in Italy by unfavourable weather conditions during the period of growth of the beet crop and much more by the decrease of areas sown to sugar beets decreed by Government. The figure appearing in the Table for Italy was drawn from a communication of the National Association of Sugar Manufacturers, but probably this figure will be increased, because according to very recent information, the improvement noted during the last period of vegetation of the beet crop was much more important than had been previously reported.

Generally speaking, as far as the European countries figuring in the Table are concerned, increases compensate decreases, so that the total sugar production in 1941-42 should be practically the same as in 1940-41.

As regards beet sugar production in extra-European countries, the United States, according to early estimates, show a decrease nearly equivalent to that of areas sown to sugar beets.

In Japan, which from the point of view of sugar production has very little importance, the forecast is for a far greater yield than last year, while in Turkey the crop seems to be somewhat greater than in the preceding sugar-season.

E. R.

## CURRENT INFORMATION ON SUGAR.

*Hungary:* By the 25th October, pulling of sugar beets was well advanced. Roots are generally healthy and their sugar percentage is high.

*Ireland:* The area under sugar beets in 1941 is estimated at 75,000 acres against 60,770 acres in 1940 and an average of 54,650 acres in 1935 to 1939, percentages, 123.4 and 137.3.

### *Production of Cane-Sugar.*

| COUNTRIES | 1940-41 (1) | 1939-40 | Average of 1934-35 to 1938-39 | 1940-41 (1) | 1939-40 | Average of 1934-35 to 1938-39 | % 1940-41: 1939-40 = 100 | % 1940-41: Average = 100 |
|---|---|---|---|---|---|---|---|---|
| | 000 centals | | | short tons | | | | |
| AMERICA. | | | | | | | | |
| Antigua | 540 | 309 | 520 | 27,000 | 15,000 | 25,984 | 175 | 104 |
| Argentina | 11,845 | 11,469 | 8,804 | 592,218 | 573,455 | 440,171 | 103 | 135 |
| Barbados | 1,698 | 1,587 | 2,718 | 85,000 | 79,000 | 135,905 | 107 | 62 |
| Brazil | 28,338 | 26,277 | 23,231 | 1,416,900 | 1,313,800 | 1,161,530 | 108 | 122 |
| Cuba | (2) 54,678 | 63,163 | 60,266 | (2) 2,733,880 | 3,158,000 | 3,013,269 | 87 | 91 |
| United States (La.&Fl) | 6,729 | 10,392 | 8,528 | 336,453 | 519,597 | 426,400 | 65 | 79 |
| British Guiana | 4,255 | 3,748 | 4,233 | 213,000 | 190,000 | 211,669 | 114 | 101 |
| Jamaica | 3,492 | 2,227 | 2,289 | 174,600 | 111,000 | 114,455 | 157 | 153 |
| Martinique | 1,213 | 1,323 | 1,167 | 61 000 | 70,000 | 58,359 | 92 | 104 |
| Mexico | 7,275 | 6,834 | 6,763 | 360 000 | 340,000 | 338,128 | 106 | 108 |
| Peru | 8,929 | 8,897 | 8,426 | 446 000 | 444,829 | 421,291 | 100 | 106 |
| Puerto Rico | 18,629 | 20,375 | 17,748 | 931,000 | 1,018,700 | 887,390 | 91 | 105 |
| Dominican Republic | (2) 8,685 | 10,027 | 9,339 | (2) 434,260 | 501,366 | 466,926 | 87 | 93 |
| St. Kitts | 851 | 692 | 700 | 42,500 | 34,600 | 34,977 | 123 | 122 |
| Trinidad | 2,734 | 2,065 | 3,086 | 137,000 | 103,250 | 154,308 | 132 | 89 |
| Venezuela | 611 | 542 | 514 | 30,500 | 27,100 | 25,706 | 113 | 119 |
| *Total America* | *160,502* | *169,927* | *158,332* | *8,021,311* | *8,499,697* | *7,916,468* | *94* | *101* |
| ASIA. | | | | | | | | |
| Taiwan | 17,593 | 26,630 | 23,776 | 880,000 | 1,331,500 | 1,188,782 | 66 | 74 |
| India | 76,148 | 74,120 | 72,761 | 3,807,000 | 3,706,000 | 3,638,000 | 103 | 105 |
| Japan | 2,205 | 3,386 | 2,751 | 100,000 | 169,300 | 137,560 | 65 | 80 |
| Java | 38,757 | 35,869 | 23,832 | 1 938,000 | 1,793,000 | 1,191,582 | 108 | 163 |
| Philippines | (2) 21,839 | (2) 21,065 | 21,141 | (2) 1,091,900 | (2) 1,053,200 | 1,057,042 | 104 | 103 |
| *Total Asia* | *156,542* | *161,070* | *144,261* | *7,816,900* | *8,053,000* | *7,212,966* | *97* | *109* |
| AFRICA. | | | | | | | | |
| Egypt | 3,836 | 3,524 | 3,213 | 192,000 | 176,198 | 160,668 | 109 | 119 |
| Mauritius | 6,972 | 5,059 | 6,150 | 348,600 | 252,930 | 307,505 | 138 | 113 |
| Reunion | 2,441 | 1,622 | 1,782 | 122,000 | 81,100 | 89,098 | 150 | 137 |
| Union of South Africa | 11,463 | 11 839 | 10,010 | 570,000 | 592,000 | 580,515 | 97 | 115 |
| *Total Africa* | *24,712* | *22,044* | *21,155* | *1,232,600* | *1,102,228* | *1,057,786* | *112* | *117* |
| OCEANIA. | | | | | | | | |
| Australia | 18,010 | 20,787 | 16,607 | 900,500 | 1,039,400 | 830,341 | 87 | 108 |
| Hawaii | 19,379 | 19,028 | 19,112 | 969,000 | 951,400 | 955,596 | 102 | 101 |
| Fiji Islands | 2,690 | 2,257 | 2,973 | 134,000 | 128,000 | 148,630 | 105 | 90 |
| *Total Oceania* | *40,079* | *42,372* | *38,692* | *2,003,500* | *2,118,800* | *1,934,567* | *95* | *104* |
| TOTALS | **381,835** | **395,413** | **362,440** | **19,074,311** | **19,773,725** | **18,121,787** | **97** | **105** |

(1) Approximate data. — (2) Willet & Gray estimate.

*Italy:* The National Association of Sugar Producers published the following information. During the month of September, weather conditions were generally favourable to the sugar beet crop. Frequent rains fell in the week 7-15 September over some beet producing regions; many factories could not be provisioned and some of them had to slow down their production Owing to rain, the formation of new leaves was retarded, but this phenomenon was not widespread. During the second half of the month, the weather was fine, and deliveries could be carried on regularly. This favourable course of the weather not only diminished the retrogression of leaves, but in many factories it was registered an increase in the beets sugar content. In fact average polarisation in the 1st week of the month was 16.8 per cent., against 16 0 per cent. the week before. Sugar beet production will undoubtedly be sufficient to insure the fulfillment of the production plan of beet alcohol, and a much greater production of sugar than had been forecast This production will be enough to entirely fill the sugar needs of the country

*Netherlands:* The analysis of sugar beets in the first week in October showed a weight of the tuber of 26 1 ounces against 26 2 ounces in the average, a sugar content of 17 2 per cent against 18 0 per cent, a weight of sugar per root of 4.5 ounces against 4.7 ounces

*Romania* Towards the 20th October the harvesting of sugar beets was being done with difficulty, particularly in Transylvania and Moldavia Production is generally weak

*Sweden* Good yields are generally expected from the sugar beet crop The condition of the culture, expressed in the country's system, was equal to 3.2 at October 15, against 3 1 at September 1, and 3 2 at October 1, 1940

*Argentina* Owing to damages caused by frost to sugar cane plantations, all the cane cut in the province of Tucuman has been taken over by factories In the provinces of Falta, Jujuy and Corrientes the season yields were good

*United States* According to the November Crop Report area cultivated to sugar beets is 761,000 acres, against 916, 000 in 1940 and 828,000 on the average of the preceding 5-year period, percentages 83 1 and 91 9 The corresponding production is estimated at 202,600,000 centals (10,130,000 short tons) against 243,840,000 (12,192,000) and 192,464,000 (9,623,000), percentages 83 1 and 105 3.

According to the October Crop Report (the Report published last month was the September Report) the production of sugarcane for sugar in 1941 is estimated at 104,080,000 centals (5,204,000 short tons) against 77,620,000 (3,881,000) in 1940 and an average of 113,632,000 (5,682,000) in 1935 to 1939, percentages, 134.1 and 91.6

The production of canesugar in 1941-42 is estimated at 8,940 000 centals (447,000 short tons) against 6,729,000 (336,450) in 1940-41 and an average of 9,476,000 (473,800) in 1935-36 to 1939-40, percentages, 133 and 94.

## CURRENT INFORMATION ON VINES.

*Spain:* In the month of October the weather was very favourable to vintage which took place under good conditions. Forecasts on production, however, are not very good, although they are not as bad as was feared. In the Mancha, for instance, results were better than had been expected, even though yields remained below normal In Catalonia, yields were average, notwistanding damages caused by unfavourable circumstances. In the Rioja-Navarra region, yields were below average, and in all the other wine producing provinces vintage was bad.

According to very recent information, the gathering of raisins in the important wine region of Mancha gave very good results also from the point of view of the quality of the crop.

*France:* According to unofficial information, wine production this year is not above 1,100 million imperial gallons (1,300 american gallons). A 30 per cent. reduction in wine consumption, as compared with normal times, must be expected.

*Hungary:* Changeable weather conditions during the three weeks ending October 25, were unfavourable to the ripening of grapes. Vintage, at that time, was still going on.

*Romania:* Vintage had been started towards the middle of October. Owing to cold weather, grapes did not ripen regularly and the quality of the wine is mediocre The production of wine this year is much below average both as to quality and quantity. As a result of this situation, and also owing to the fact that the stocks of the 1940 vintage are very low, the price of wine is rather high.

*Switzerland:* The production of wine in 1941 is estimated at 20,821,000 Imperial gallons, (25,004,000 American gallons) against 10,164,000 (12,205,000) in 1940 and an average of 13,789,000 (16,559,000) in 1935 to 1939; percentages, 204.9 and 151.0.

*United States:* Total production of grapes in 1941 is estimated at 53,290,000 centals (2,664,500 short tons) against 50,878,000 (2,513,900) in 1940 and an average of 49,500,000 (2,475,400) in 1935 to 1939, percentages, 104 7 and 107 6.

*Algeria:* At the beginning of November vintage was almost over. Yield appears considerably below that of last year, owing to damages caused by pests and drought.

## CURRENT INFORMATION ON OLIVES.

*Spain:* No reliable information regarding the olive crop is yet available. The situation is irregular. High yields however are forecast for Andalusia and particularly in the important Jaen province.

*Greece:* The Ministry of Agriculture has communicated that at the beginning of November the authorities of the forces of occupation authorised the free export of a certain quantity of olive oil from the islands of Mytilene and Crete for the victualling of the population of Athens.

## CURRENT INFORMATION ON FLAX.

*Argentine:* Drought and frost during the month of October did some damage to the flax crop. At the beginning of November conditions were considered satisfactory.

The fourth official estimate of area sown to flax in 1941-42 practically confirms the estimate of last month: at present it is 6.746.100 acres, against 6,760,000 in 1940-41 and 7,301,000 as an average for the five preceding years; percentages 99.8 and 92.4.

*Canada:* The production of linseed in the Prairie Provinces is estimated at 3,819,200 centals (6,820,000 bushels) against 1,610,000 (2,875,000) in 1940 and an average of 797,700 (1,424,500) in 1935 to 1939; percentages, 237.2 and 478.8.

*Uruguay:* Rain which fell in October, improved the condition of the flax crop that in September had suffered from drought. Although this crop is not very thick, its condition is now considered good

*New Zealand:* According to press information, the cultivation of flax for bast has strongly increased in the last two years, especially in the southern part of the country. The area sown to flax in 1939-40 had been hardly 400 acres. In 1940-41 it has grown to 14,000 acres. In order to meet the growing demand from the United Kingdom which cannot any longer import its flax from exporting countries of the European continent, the New Zealand Government is planning to double the latter figure in 1940-41.

## CURRENT INFORMATION ON COTTON.

*Romania* Owing to too much rain in Autumn, cotton production this year has been weak. For next year it is expected that the cultivation of cotton will be increased, in spite of the difficulty of finding a sufficient quantity of seeds for sowing

*United States*

### Summary of the Cotton Reports issued by the Government of the United States, during the cotton season (August 1-July 31).

| | Provisional estimates for dates indicated 1941-42 | Final estimates 1940-41 | Final estimates Average 1935-36 to 1939-40 | Percent. 1941-42: 1940-41 = 100 | Percent. 1941-42: Aver. = 100 |
|---|---|---|---|---|---|
| *Report referring to July 1:* | | | | | |
| Area in cultivation (acres) | 23,519,000 | 24,871,000 | 28,496,000 | 94 6 | 82.5 |
| *Report referred to August 1:* | | | | | |
| Area left for harvest (acres) | (1) 23,102,000 | (2) 23,861,000 | (2) 27,788,000 | 96.8 | 83.1 |
| Crop condition (per cent. of normal) | 72 | 72 | (3) 72 | — | — |
| Production (4) | 10,817,000 | 12,565,000 | 13,148,000 | 86 1 | 82.3 |
| Yield of lint per acre, in lb. | 224.4 | 252.5 | (3) 205.4 | 88.9 | 109.3 |
| *Cotton ginned to August 1* (5) | 1,966 | 32,187 | 114,716 | 6.1 | 1.7 |
| *Cotton ginned to August 16* (5). | 74,101 | 169,420 | 342,397 | 43.7 | 21.6 |
| *Report referred to September 1:* | | | | | |
| Area left for harvest (acres) | (6) 22,633,000 | (2) 23,861,000 | (2) 27,788,000 | 94.9 | 81.4 |
| Crop condition (per cent. of normal) | 65 | 74 | (3) 63 | — | — |
| Production (4) | 10,710,000 | 12,565,000 | 13,148,000 | 85.2 | 81.5 |
| Yield of lint per acre, in lb. | 226.8 | 252.5 | (3) 205.4 | 89.8 | 110.4 |
| *Cotton ginned to September 1* (5) | 504,125 | 605,798 | 1,424,198 | 83.2 | 35.4 |
| *Cotton ginned to September 14* (5) | 2,093,414 | 1,805,621 | 3,559,517 | 115.9 | 58.8 |
| *Report referred to October 1:* | | | | | |
| Crop condition (per cent. of normal) | 64 | 72 | (3) 64 | — | — |
| Production (4) | 11,061,000 | 12,565,000 | 13,148,000 | 88.0 | 84.1 |
| Yield of lint per acre, in lb | 234.2 | 252 5 | (3) 205.4 | 92.8 | 114.0 |
| *Cotton ginned to October 1* (5) | 4,713,227 | 3,923,172 | 6,356,653 | 120.1 | 74.1 |
| *Cotton ginned to October 18* (5) | 6,855,808 | 7,029,593 | 8,805,241 | 97 5 | 77.9 |
| *Report referred to November 1:* | | | | | |
| Production (4) | 11,020,000 | 12,565,000 | 13,148,000 | 87.7 | 83.8 |
| Yield of lint per acre, in lb. | 233.3 | 252.5 | (3) 205.4 | 92.4 | 113.6 |
| *Cotton ginned to November 1* (5) | 7,964,000 | 9,089,089 | 10,198,090 | 87.6 | 78.1 |
| *Cotton ginned to November 14* (5) | 8,808,361 | 10,072,081 | 11,115,165 | 87.5 | 79.2 |

(1) Area under cultivation on 1 July less the ten-year (1931-40) average abandonment from natural causes, 1.9 per cent. — (2) Area actually harvested. — (3) Ten-year (1930-39) average. — (4) In bales of 478 lb. net weight and exclusive of linters. — (5) In running bales, counting round bales as half bales and exclusive of linters. — (6) Area in cultivation on July 1, 1941, less 3.8 per cent. representing the area which has been, or will be abandoned from natural causes, after that date.

## CURRENT INFORMATION ON TOBACCO.

*Croatia:* The old plan of the Government of former Yugoslavia which considered a reduction of areas sown to tobacco in Herzegovina and Croatian Dalmatia, has been recently modified by the Croatian Government. The competent agricultural authorities have issued orders for the establishment of new tobacco plantations in these regions. Works of cutting tobacco leaves in the regions of Herzegovina, Bosnia and Croatian Dalmatia began by the middle of October. The Direction of Monopolies of Zagreb estimates this year yield of the tobacco crop at nearly 13,228,000 pounds.

*United States:* According to the November Crop Report area cultivated to tobacco is 1,376,500 acres, against 1,404,350 in 1940 and 1,646,000 on the average of the preceding 5-year period; percentages: 98.0 and 83.6. The corresponding production is estimated at 1,267,404,000 lb. against 1,451,966,000 and 1,453,120,000; percentages: 87.3 and 87 2

*Mexico:* The 1941 tobacco crop is estimated at 33,000,000 lbs., against 52,200,000 lbs. in 1940 and an average of 38,134,000 lbs. in the five previous years: percentages 63.1 and 86 5. For the year 1942, it is estimated that the area to be sown to tobacco will be nearly 20 per cent. above that actually sown to that crop in 1941.

*New Zealand:* According to the latest estimate area cultivated to tobacco in 1941 is 2,963 acres, against 2,586 in 1940 and 1,757 on the average of the preceding 5-year period, percentages: 114.5 and 168.6. The corresponding production is estimated at about 3,100,000 lb. against 2,500,000 and 1,367, 400; percentages: 124.0 and 226.7.

## CURRENT INFORMATION ON OTHER PRODUCTS.

### Coffee.

*Brazil:* The exportable production of coffee of the season 1941-42, as estimated by the 'Departamento Nacional do Café' for the period ending 31st March 1942, reaches 16,914,000 centals. For disposal of the commercial season of 1941-42 the stocks carried over from the 1940-41 season amounting to 7,937,000 centals have been added to this quantity.

Consequently, the total amount of the exportable supplies in 1941-42 reaches 24,815,000 centals against 27,924,000 centals of the previous season. In the following table we are publishing the partial amounts of the season 1941-42 according to producing States, compared with the corresponding amounts of the three previous seasons.

| States | 1-VI-1941 to 31-III-1942 | 1-VI-1940 to 31-III-1941 | 1-VI-1939 to 31-III-1940 | 1-VI-1938 to 31-III-1939 |
|---|---|---|---|---|
| | (thousand centals) | | | |
| São Paulo | 7,617 | 18,519 | 20,909 | 19,524 |
| Minas Geraes | 4,016 | 4,630 | 4,112 | 5,216 |
| Espírito Santo | 2,403 | 1,984 | 1,254 | 1,448 |
| Rio de Janeiro | 755 | 992 | 708 | 1,238 |
| Paraná | 1,382 | 926 | 1,140 | 714 |
| Bahia | 397 | 331 | 397 | 397 |
| Pernambuco | 265 | 106 | 265 | 265 |
| Goiás | 79 | 92 | 132 | 132 |
| Total | 16,914 | 27,580 | 28,917 | 28,934 |
| Stocks remaining for disposal from preceding seasons | 7,937 | 344 | 926 | 2,381 |
| Total exportable production | 24,851 | 27,924 | 29,843 | 31,315 |

*Salvador:* According to the latest official repord, the 1941-42 coffee production amounts to 1,216,956 centals, against 1,433,009 centals in 1940-41, and 1,444,033 centals as an average for the five preceding years: percentages 84.9 and 84.3.

The production of the year 1941-42 has been subdivided in three parts, of which one, including 65 per cent. of the total, is destined to exports; another part amounts to 10 per cent. and the third part, intended as a balance quota, amounts to 25 per cent. of the total.

*Angola* According to several unofficial sources of information, the coffee crop in many regions seems to be better than last year.

**Groundnuts.**

*United States* According to the November Crop Report area cultivated to peanuts is 1,908,000 acres, against 2,007,000 in 1940 and 1,629,000 on the average of the preceding 5-year period, percentages, 95 1 and 117 1 The corresponding production of picked and threshed peanuts is estimated at 1,474,690,000 lb against 1,734,340,000 lb and 1,221,962,000 lb, percentages 85 0 and 120 7

**Colza and Sesame.**

*Hungary* Towards the 25th of October, the sowing of winter colza had been done nearly everywhere in spite of drought Crops still needed two or three weeks of warm weather

*Netherlands* Area sown to colza this year is estimated at 32,000 acres as against an average of 7,400 acres in the last years

*Serbia* The Ministry of Agriculture has prepared a plan for the creation of new factories for the extraction of oil from oleagineous seeds. At the same time the Ministry has taken some measures for the increase of prices of oleagineous seeds (colza, sunflower, soja etc ) in order to encourage the cultivation of these crops.

**Soyabeans.**

*Croatia:* For the next agricultural season, a strong increase of area destined to the cultivation of soya is expected.

*United States* According to the November Crop Report area cultivated to soya beans for beans is 5,918,000 acres, against 4,961,000 in 1940 and 2,980,000 on the average of the preceding 5-year period, percentages: 119.3 and 198.6. The corresponding production is estimated at 66,780,000 centals (111,300,000 bushels) against 47,902,000 (79,837,000) and 32,836,000 (54,727,000); percentages. 139.4 and 203 4.

## CURRENT INFORMATION ON FODDER CROPS.

*Finland:* During the month of October, the quantity of forage available for milch-cow feeding was scarce.

*Hungary:* Towards the 25th of October, the sowing of clover was over nearly everywhere in spite of drought. At that time the pulling of forage beets had been started. Yields are satisfactory. Cold weather has retarded the growth of natural meadows and pastures.

By the middle of November the quantity of fibrous forages was generally sufficient. Even in some places where forages are scarce, it will be possible to feed the animals till Spring by a careful distribution of quantities available. Here and there the lack of forage beets is badly felt. Great economy is required in the use of forage cereals.

*Ireland:* Total area under hay in 1941 is estimated at 1,983,900 acres against 2,126,400 acres in 1940 and an average of 2,063,900 acres in 1935 to 1939; percentages, 93.3 and 96.1.

The area under mangels is estimated at 96,800 acres against 93,400 acres in 1940 and an average of 85,300 acres in 1935 to 1939; percentages, 103.6 and 113.5.

The area under turnips is estimated at 158,700 acres against 151,000 acres in 1940 and an average of 147,000 acres in 1935 to 1939; percentages, 105 1 and 108.0.

*Sweden:* Forage beets were damaged by pests; the situation is irregular and frequent frosts caused damages. Meadows and pastures improved after rains, and grass was sufficient for cattle feeding. Only in some months a second hay cut was possible.

*Argentina:* In October, the conditions of pastures was mediocre, owing to drought and frost in the course of the month.

*United States:* The production of tame hay in 1941 is estimated at 1,714,660,000 centals (85,733,000 short tons) against 1,726,240,000 (86,312,000) in 1940 and an average of 1,489,080,000 (74,454,000) in 1935 to 1939; percentages, 99 3 and 115.1

# *LIVESTOCK AND DERIVATIVES*

## PIGS IN DENMARK.

(Thousands of head)

| CLASSIFICATION * | 1941 | | | | | | | 1940 | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Oct. 4 | Aug. 23 | July 12 | May 30 | April 19 | March 8 | Jan. 25 | Dec. 13 | Nov. 2 | Sept. 21 |
| Boars for breeding. | 10 | 11 | 11 | 11 | 11 | 11 | 11 | 11 | 13 | 14 |
| Sows in farrow for first time . . . | 44 | 57 | 78 | 74 | 64 | 45 | 32 | 25 | 22 | 23 |
| Other sows in farrow | 79 | 86 | 85 | 87 | 87 | 93 | 100 | 103 | 108 | 120 |
| Sows in milk . . . | 59 | 61 | 53 | 47 | 51 | 45 | 44 | 49 | 60 | 64 |
| Sows not yet covered (and not for slaughter) . | 24 | 22 | 17 | 18 | 15 | 17 | 20 | 23 | 32 | 38 |
| Sows for slaughter. | 18 | 10 | 7 | 8 | 7 | 11 | 14 | 17 | 23 | 26 |
| *Total sows . . . .* | *224* | *236* | *240* | *234* | *224* | *211* | *210* | *217* | *245* | *271* |
| Sucking pigs not weaned . . . . | 494 | 515 | 440 | 390 | 429 | 364 | 350 | 401 | 515 | 539 |
| Young and adult pigs for slaughter: | | | | | | | | | | |
| Weaned pigs under 35 kg. . . | 524 | 462 | 420 | 432 | 409 | 455 | 523 | 607 | 669 | 755 |
| Pigs of 35 and under 60 kg. . | 401 | 399 | 405 | 366 | 419 | 473 | 503 | 516 | 600 | 665 |
| Fat pigs of 60 kg. and over . | 360 | 317 | 254 | 288 | 333 | 359 | 371 | 437 | 486 | 497 |
| *Total pigs . . .* | *2,013* | *1,940* | *1,770* | *1,721* | *1,825* | *1,873* | *1,968* | *2,189* | *2,528* | *2,741* |

* Rural districts.

## CURRENT INFORMATION ON LIVESTOCK AND DERIVATIVES.

*Bulgaria:* According to reliable calculations, with the acquisition of the new regions (Macedonia, and Western Thrace) recently annexed to Bulgaria the following numbers of livestock were added to the already existing stock: Oxen, 584.000 (1,5 million heads were in the country according to the 1934 census); buffaloes, 60,000 (375,000), horses, 111,000 (532,000); mules, 25,000 (37,000); asses, 137,000 (180,000); sheep, 2,3 millions (8,8 millions), goats, 1,2 millions (931,000); pigs, 116,000 (902,000).

The Council of Ministry recently approved a project of law aiming at the reduction of goat pastures. This measure is intended to prevent an increase of the number of goats which represent a danger for the forests of the country, and at encouraging reforestation. Raising of goats herds will be allowed only in poor agricultural exploitations, while in the others, goats will be replaced by cows in order to prevent a reduction in the milk production of the country.

*Finland:* Owing to the scarcity of forage, milk production as compared to the corresponding period last year, is scarce.

*Greece:* A recent order by the Ministry of Agriculture forbids slaughtering of productive cattle all over the country.

*Hungary.* Towards November 15, the conditions of livestock was generally satisfactory

*Argentina:* In October the health of cattle was generally good

## CURRENT INFORMATION ON SERICULTURE.

*Romania.* In order to encourage sericulture, the Government has facilitated imports of silk worms for incubation.

# TRADE

| COUNTRIES | September: Exports 1941 | September: Exports 1940 | September: Imports 1941 | September: Imports 1940 | Two months (August 1-September 30): Exports 1941 | Two months: Exports 1940 | Two months: Imports 1941 | Two months: Imports 1940 | September: Exports 1941 | September: Exports 1940 | September: Imports 1941 | September: Imports 1940 | Two months (August 1-September 30): Exports 1941 | Two months: Exports 1940 | Two months: Imports 1941 | Two months: Imports 1940 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Wheat.** | | | | | | | | | | | | | | | | |
| | Thousand centals (1 cental = 100 lb.) | | | | | | | | Thousand bushels of 60 lb. | | | | | | | |
| Portugal | 0 | 0 | 24 | 280 | 0 | 0 | 881 | 280 | 0 | 0 | 40 | 467 | 0 | 0 | 1,468 | 467 |
| Romania | 0 | 0 | — | — | 0 | 15 | — | — | 0 | 0 | — | — | 0 | 25 | — | — |
| Sweden | — | — | 0 | 3 | — | — | 0 | 39 | — | — | 0 | 4 | — | — | 0 | 65 |
| United States | 2,263 | 593 | 1,203 | 433 | 2,724 | 1,153 | 2,293 | 789 | 3,771 | 988 | 2,004 | 722 | 4,540 | 1,922 | 3,821 | 1,315 |
| Argentina | 3,633 | 4,407 | — | — | 8,491 | 10,623 | — | — | 6,055 | 7,346 | — | — | 14,152 | 17,705 | — | — |
| **Wheat Flour.** | | | | | | | | | | | | | | | | |
| | Thousand centals (1 cental = 100 lb.). | | | | | | | | Thousand barrels of 196 lb. | | | | | | | |
| Portugal | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| United States | 832 | 857 | 3 | 30 | 1,820 | 1,709 | 4 | 48 | 425 | 437 | 2 | 15 | 929 | 872 | 2 | 24 |
| Argentina | 89 | 90 | — | — | 187 | 215 | — | — | 45 | 46 | — | — | 95 | 110 | — | — |
| **Total Wheat and Flour †).** | | | | | | | | | | | | | | | | |
| | Thousand centals (1 cental = 100 lb) | | | | | | | | Thousand bushels of 60 lb. | | | | | | | |
| | Net Exports (*) | | Net Imports (**) | | Net Exports (*) | | Net Imports (**) | | Net Exports (*) | | Net Imports (**) | | Net Exports (*) | | Net Imports (** | |
| Portugal | — | — | 24 | 280 | — | — | 883 | 280 | — | — | 40 | 467 | — | — | 1,471 | 467 |
| United States | 2,166 | 1,263 | — | — | 2,853 | 2,579 | — | — | 3,609 | 2,106 | — | — | 4,755 | 4,299 | — | — |
| Argentina | 3,751 | 4,528 | — | — | 8,740 | 10,780 | — | — | 6,251 | 7,546 | — | — | 14,567 | 17,966 | — | — |
| **Rye.** | | | | | | | | | | | | | | | | |
| | Thousand centals (1 cental = 100 lb.). | | | | | | | | Thousand bushels of 56 lb. | | | | | | | |
| | Exports | | Imports | | Exports | | Imports | | Exports | | Imports | | Exports | | Imports | |
| Romania | 0 | 4 | — | — | 0 | 13 | — | — | 0 | 8 | — | — | 0 | 23 | — | — |
| Sweden | — | — | 0 | 323 | — | — | 0 | 384 | — | — | 0 | 577 | — | — | 0 | 685 |
| United States | 4 | 134 | 194 | 0 | 6 | 134 | 194 | 0 | 8 | 239 | 346 | 0 | 10 | 239 | 347 | 0 |
| Argentina | 0 | 149 | — | — | 2 | 149 | — | — | 0 | 265 | — | — | 3 | 265 | — | — |
| **Barley.** | | | | | | | | | | | | | | | | |
| | Thousand centals (1 centals = 100 lb.). | | | | | | | | Thousand bushels of 48 lb. | | | | | | | |
| Romania | 3 | 0 | — | — | 3 | 0 | — | — | 7 | 0 | — | — | 7 | 0 | — | — |
| United States | 69 | 2 | 36 | 94 | 264 | 76 | 37 | 177 | 145 | 3 | 75 | 196 | 550 | 158 | 76 | 368 |
| Argentina | 95 | 308 | — | — | 358 | 468 | — | — | 198 | 643 | — | — | 746 | 975 | — | — |

(*) Excess of exports over imports. — (**) Excess of imports over exports.
(†) Flour reduced to grain on the basis of the coefficient: 1,000 centals of flour = 1,333.333 centals of grain (Thousand barrels of flour = 4,355.55 bushels of grain).

## Oats.

| COUNTRIES | September Exports 1941 | September Exports 1940 | September Imports 1941 | September Imports 1940 | Two months (August 1-September 30) Exports 1941 | Two months Exports 1940 | Two months Imports 1941 | Two months Imports 1940 | September Exports 1941 | September Exports 1940 | September Imports 1941 | September Imports 1940 | Two months (August 1-September 30) Exports 1941 | Two months Exports 1940 | Two months Imports 1941 | Two months Imports 1940 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Thousand centals (1 cental = 100 lb.) | | | | | | | | Thousand bushels of 32 lb. | | | | | | | |
| Sweden | — | — | 32 | 0 | — | — | 33 | 14 | — | — | 101 | 0 | — | — | 103 | 4 |
| United States | 42 | 3 | 7 | 147 | 48 | 4 | 95 | 410 | 131 | 10 | 23 | 460 | 150 | 12 | 298 | 1 2 |
| Argentina | 228 | 42 | — | — | 446 | 80 | — | — | 711 | 131 | — | — | 1,395 | 250 | — | — |

## Maize.

| COUNTRIES | September Exports 1941 | September Exports 1940 | September Imports 1941 | September Imports 1940 | Eleven Months (November 1-September 30) Exports 1940-41 | Exports 1939-40 | Imports 1940-41 | Imports 1939-40 | September Exports 1941 | September Exports 1940 | September Imports 1941 | September Imports 1940 | Eleven Months (November 1-September 30) Exports 1940-41 | Exports 1939-40 | Imports 1940-41 | Imports 1939-4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Thousand centals (1 cental = 100 lb.). | | | | | | | | Thousand bushels of 56 lb. | | | | | | | |
| Portugal | 0 | 0 | 124 | 20 | 7 | 0 | 1,667 | 274 | 0 | 0 | 221 | 35 | 13 | 0 | 2 977 | 48 |
| Romania | 12 | 189 | — | — | 3,303 | 13,460 | — | — | 21 | 337 | — | — | 5,897 | 24,036 | — | — |
| United States | 1,574 | 1 317 | 28 | 23 | 5 079 | 21,523 | 552 | 603 | 2,811 | 2,353 | 50 | 41 | 9,069 | 38,434 | 987 | 1,0 |
| Argentina | 1,491 | 1,022 | — | — | 11,277 | 44,371 | — | — | 2,662 | 1,824 | — | — | 20,138 | 79,234 | — | — |
| Peru | | ... | . | . | .. | ... | [3]) 0 | [3]) 1 | ... | ... | ... | .. | ... | ... | [3]) 1 | [3]) |
| China | ... | .. | — | — | [2]) 11 | [2]) 0 | — | — | ... | ... | — | — | [2]) 19 | [2]) 0 | — | — |

## Rice.

| COUNTRIES | September Exports 1941 | September Exports 1940 | September Imports 1941 | September Imports 1940 | Nine Months (January 1-September 30) Exports 1941 | Exports 1940 | Imports 1941 | Imports 1940 | September Exports 1941 | September Exports 1940 | September Imports 1941 | September Imports 1940 | Nine Months (January 1-September 30) Exports 1941 | Exports 1940 | Imports 1941 | Imports 1940 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Thousand centals (1 cental = 100 lb.). | | | | | | | | Thousand bushels of 45 lb. | | | | | | | |
| Portugal | 0 | 0 | 14 | 79 | 38 | 2 | 61 | 145 | 0 | 0 | 31 | 175 | 84 | 3 | 136 | 32 |
| United States | 226 | 248 | 5 | 18 | 3,093 | 2,431 | 128 | 310 | 503 | 551 | 10 | 41 | 6,873 | 5,401 | 285 | 68 |
| Argentina | 0 | 1 | . | ... | 11 | 5 | [1]) 43 | [1]) 147 | 0 | 2 | ... | ... | 25 | 11 | [1]) 97 | [1]) 32 |
| Peru | — | — | ... | ... | — | — | [3]) 72 | [3]) 155 | — | — | ... | ... | — | — | [3]) 159 | [3]) 34 |
| China | .. | ... | ... | ... | [2]) 3 | [2]) 106 | [2]) 13,698 | [2]) 9,351 | ... | ... | ... | ... | [2]) 6 | [2]) 235 | [2]) 30,440 | [2]) 20,7 |

## Linseed.

| COUNTRIES | September Exports 1941 | September Exports 1940 | September Imports 1941 | September Imports 1940 | Two months (August 1-September 30) Exports 1941 | Two months Exports 1940 | Two months Imports 1941 | Two months Imports 1940 | September Exports 1941 | September Exports 1940 | September Imports 1941 | September Imports 1940 | Two months (August 1-September 30) Exports 1941 | Two months Exports 1940 | Two months Imports 1941 | Two months Imports 1940 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Thousand centals (1 cental = 100 lb.). | | | | | | | | Thousand bushels of 56 lb | | | | | | | |
| Portugal | — | — | 0 | 0 | — | — | 11 | 61 | — | — | 0 | 0 | — | — | 19 | 1( |
| United States | — | — | 1,037 | 13 | — | — | 6,363 | 5,185 | — | — | 1,853 | 24 | — | — | 11,362 | 9,25 |
| Argentina | 2,182 | 474 | — | — | 9,955 | 14,451 | — | — | 3,896 | 846 | — | — | 17,776 | 25 805 | — | — |
| China | ... | ... | — | — | [2]) 27 | [2]) 6 | — | — | ... | ... | — | — | [2]) 49 | [2]) 11 | — | — |

## Cotton.

| COUNTRIES | September Exports 1941 | September Exports 1940 | September Imports 1941 | September Imports 1940 | Two months (August 1-September 30) Exports 1941 | Two months Exports 1940 | Two months Imports 1941 | Two months Imports 1940 | September Exports 1941 | September Exports 1940 | September Imports 1941 | September Imports 1940 | Two months (August 1-September 30) Exports 1941 | Two months Exports 1940 | Two months Imports 1941 | Two months Imports 1940 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Thousand centals (1 cental = 100 lb.). | | | | | | | | Thousand bales of 478 lb. | | | | | | | |
| Portugal | — | — | 39 | 42 | — | — | 77 | 65 | — | — | 8 | 9 | — | — | 16 | |
| United States | 991 | 483 | 127 | 20 | 1,398 | 829 | 344 | 71 | 207 | 101 | 27 | 4 | 292 | 174 | 72 | |
| Argentina | 1 | 55 | ... | ... | 1 | 97 | [1]) 13 | [1]) 2 | 0 | 12 | ... | ... | 0 | 20 | [1]) 3 | [1]) |

[1]) Up to August 31. — [2]) Up to July 31. — [3]) Up to June 30.

| COUNTRIES | September | | | | Twelve months (September 1-August 31) | | | | September | | | | Nine months (January 1-September 30) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Exports | | Imports | | Exports | | Imports | | Exports | | Imports | | Exports | | Imports | |
| | 1941 | 1940 | 1941 | 1940 | 1940-41 | 1939-40 | 1940-41 | 1939-40 | 1941 | 1940 | 1941 | 1940 | 1941 | 1940 | 1941 | 1940 |
| | | | | | | Thousand lb. | | | | | | | | | | |
| | | | | | **Wool.** | | | | | | | | **Butter.** | | | |
| Portugal | 0 | 0 | 0 | 68 | 0 | 2,035 | 7,086 | 3,265 | 9 | 22 | 0 | 0 | 225 | 110 | 0 | |
| United States | 4 | 0 | 61,659 | 21,830 | 4 | 485 | 773 444 | 312,286 | 225 | 265 | 247 | 99 | 2,114 | 2,114 | 1,702 | 91 |
| Argentina a) | 5,747 | 8,314 | — | — | 314,113 | 203 018 | — | — | 1,164 | 194 | — | — | 25,924 | 19,180 | — | — |
| Argentina b) | 6,627 | 3,878 | — | — | 92,226 | 71,966 | — | — | | | | | | | | |
| Peru | ... | ... | — | — | [2]12,258 | [2]11 548 | — | — | ... | ... | ... | ... | [3] 0 | [3] 0 | [3] 139 | [3] 11 |
| China | ... | ... | — | — | [2] 2,072 | [2] 1 098 | — | — | — | — | ... | . | — | — | [3] 324 | [3] 22 |
| | | | | | | Tousand lb. | | | | | | | | | | |
| | | | | | **Cheese.** | | | | | | | | **Cacao.** | | | |
| | | | | | Nine months (January 1-September 30) | | | | | | | | Twelve months (October 1 September 30) | | | |
| | | | | | 1941 | 1940 | 1941 | 1940 | | | | | 1940-41 | 1939-40 | 1940 41 | 1939 4 |
| Portugal | 2 | 20 | 0 | 0 | 238 | 190 | 20 | 29 | 35 | 0 | 714 | 99 | 119 | 29 | 2,597 | 1,34 |
| United States | 13,801 | 192 | 1,464 | 1,534 | 55,552 | 1,519 | 16,495 | 26,193 | — | — | 54,335 | 55,854 | — | — | 777,730 | 665,63 |
| Argentina | 1,942 | 992 | — | — | 21,918 | 6,034 | — | — | — | — | ... | ... | — | — | [1]11,528 | [1]10,64 |
| Peru | ... | . | . | . | [3] 0 | [3] 0 | [3] 300 | [3] 179 | ... | .. | ... | ... | 0 | 0 | [3] 518 | [3] 42 |
| | | | | | **Tea.** | | | | | | | | **Coffee.** | | | |
| | | | | | Three months (July 1-September 30) | | | | | | | | Three months (July 1-September 30) | | | |
| | | | | | | | | | | | | | 1941 | 1940 | 1941 | 1940 |
| Portugal | — | — | 31 | 20 | — | — | 110 | 55 | 35 | 192 | 714 | 1,541 | 240 | 1,874 | 1,215 | 4,66 |
| United States | — | — | 6,916 | 7,782 | — | — | 25,362 | 22,276 | 397 | 825 | 9,467 | 131,270 | 1,248 | 2,776 | 146,134 | 466,79 |
| Argentina | — | — | ... | .. | — | — | [1] 399 | [1] 750 | — | — | ... | ... | — | — | [1]10,593 | [1]15,68 |
| Colombia | — | — | — | — | — | — | — | — | 7,401 | 37,122 | — | — | ... | 135,680 | — | — |
| Ecuador | — | — | — | — | — | — | — | — | ... | ... | — | — | [1] 5,245 | [1] 5,657 | — | — |
| Peru | — | — | ... | ... | — | — | ... | ... | ... | ... | — | — | ... | ... | — | — |
| China | ... | ... | ... | ... | [2] 1,239 | [2] 6,629 | [2] 1,074 | [2] 1,645 | — | — | — | — | — | — | — | — |

a) Unwashed wool — b) Washed wool.
[1]) Up to August 31 — [2]) Up to July 31. — [3]) Up to June 30.

# STOCKS

## Total wheat in the United States (1)

| Location | Oct 1941 | July 1941 | April 1941 | Oct 1940 | Oct 1939 | Oct 1941 | July 1941 | April 1941 | Oct 1940 | Oct 1939 |
|---|---|---|---|---|---|---|---|---|---|---|
| | First day of month | | | | | | | | | |
| | thousand centals | | | | | thousand bushels | | | | |
| On farms | 295 394 | 53 458 | 117 453 | 221 668 | 200 530 | 492 324 | 89 097 | 195 755 | 369 447 | 334 217 |
| In interior mills and elevators | 134 385 | 43 944 | 78 748 | 111 293 | 93 517 | 223 975 | 73 240 | 131 246 | 185 488 | 155 862 |
| Commercial wheat in store | 169 653 | 91 138 | 85 138 | 111 158 | 97 227 | 282 755 | 151 896 | 141 897 | 185 263 | 162 045 |
| In merchant mills and elevators (2) | 66 319 | 40 725 | 34 622 | 62 694 | 71 218 | 110 532 | 67 875 | 57 703 | 104 490 | 118 696 |
| Stored for others in merchant mills (2) | 26 622 | 15 604 | 11 383 | 17 297 | 11 182 | 44 370 | 26 007 | 18 972 | 28 829 | 18 636 |
| *Total U. S. wheat as grain* | *692 373* | *244 869* | *327 344* | *524 110* | *473 674* | *1 155 956* | *408 115* | *545 573* | *873 517* | *789 456* |
| Flour (in terms of grain) in merchant mills (2) | 13 818 | 12 092 | 11 756 | 14 103 | 12 357 | 23 030 | 20 154 | 19 594 | 23 505 | 20 595 |
| *Total U. S. wheat* | *706 191* | *256 961* | *339 100* | *538 213* | *486 031* | *1 176 986* | *428 769* | *565 167* | *897 022* | *810 051* |
| Canadian wheat in store and in bond in the U. S. | 1 629 | 20 527 | 24 429 | 20 401 | 6 886 | 2 715 | 34 210 | 40 715 | 34 002 | 11 477 |
| **Total wheat in the U. S.** | **707 820** | **277,488** | **363,529** | **558,614** | **492 917** | **1,179 701** | **462,479** | **605,882** | **931,024** | **821,528** |

(1) Incomplete data: wheat in transit is not included, wheat flour only if in mills. — (2) The figures of the partial quarterly census taken by the Bureau of Census (see next table) have been adjusted to allow for stocks in all mills.

## Wheat and wheat-flour held by commercial mills in the United States (1)

| Location | Sept 1941 | June 1941 | March 1941 | Sept 1940 | Sept 1939 | Sept 1941 | June 1941 | March 1941 | Sept 1940 | Sept 1939 |
|---|---|---|---|---|---|---|---|---|---|---|
| | Last day of month | | | | | | | | | |
| | thousand centals | | | | | thousand bushels | | | | |
| Wheat stocks the property of commercial millers | | | | | | | | | | |
| Wheat held in mills and mill elevators attached to mills | 62 075 | 37 996 | 32 579 | 57 678 | 65 947 | 103 458 | 63 327 | 54 298 | 96 131 | 109 912 |
| Wheat in other elevators (2) | 17 317 | 7 288 | 5 453 | 13 629 | 17 588 | 28 862 | 12 147 | 9 088 | 22 715 | 29,314 |
| Wheat in transit to merchant mills, and bought to arrive (3) | 9 087 | 9 416 | 7 788 | 8 497 | 10 522 | 15 145 | 15 692 | 12 980 | 14 162 | 17 536 |
| *Total* | *88 479* | *54 700* | *45 820* | *79 804* | *94 057* | *147 465* | *91 166* | *76 366* | *133 007* | *156 762* |
| Wheat flour in mills and warehouses, and in transit sold and unsold | 8 989 | 7 842 | 7 688 | 9 019 | 7 934 | 4 586 | 4 001 | 3 923 | 4 601 | 4 058 |
| Wheat stored for others in mills and mill elevators and in all other positions | (5) 24 918 | 22 793 | 18 276 | 27 024 | 15 965 | (5) 41 530 | 37 989 | 30 459 | 45 039 | 26 608 |
| **Grand total (4)** | **(5) 126,329** | **88,776** | **75,15[illegible]** | **119,804** | **121,465** | **(5) 210,549** | **147,959** | **125,262** | **199,673** | **202 442** |

(1) Partial census by the Bureau of Census including mills accounting for over 90 % of the total capacity of all commercial mills. — (2) In country elevators, in public terminal elevators and in private terminal elevators not attached to mills. — (3) Of the quantities given under this item only about one third are actually in transit. — (4) Including flour in terms of grain. — (5) Not including wheat stored for others outside mills and mill elevators attached to mills.

## Commercial cereals in store in Canada and the United States.

| Products and location | Nov. 1941 | Oct. 1941 | Sept. 1941 | Nov. 1940 | Nov 1939 | Nov. 1941 | Oct. 1941 | Sept 1941 | Nov. 1940 | Nov. 1939 |
|---|---|---|---|---|---|---|---|---|---|---|
| | Friday or Saturday nearest 1st of month (¹) | | | | | | | | | |
| | thousand centals | | | | | thousand bushels | | | | |
| **Wheat:** | | | | | | | | | | |
| Canadian in Canada | ... | . . | 262,853 | 245,614 | 201,267 | ... | ... | 438,088 | 409,356 | 335,445 |
| U. S. in Canada | . . | ... | 123 | 695 | 581 | ... | ... | 205 | 1,158 | 969 |
| U. S. in the United States (²) | 168,353 | 169,653 | 164,760 | 105,834 | 90,609 | 280,588 | 282,755 | 274,600 | 176,390 | 151,015 |
| Canadian in the United States | 11,845 | 1,629 | 15,489 | 21,980 | 9,485 | 19,742 | 2,715 | 25,815 | 36,633 | 15,808 |
| Total | ... | ... | *443,225* | *374,123* | *301,942* | ... | ... | *738,708* | *623,537* | *503,237* |
| **Rye:** | | | | | | | | | | |
| Canadian in Canada | ... | ... | 1,116 | 1,645 | 1,703 | .. | ... | 1,993 | 2,938 | 3,041 |
| U. S. in Canada | ... | ... | 13 | 13 | 13 | ... | ... | 24 | 24 | 24 |
| U. S. in the United States (²) | 9.802 | 9,516 | 8,197 | 4,543 | 5,923 | 17,504 | 16,993 | 14,637 | 8,112 | 10,577 |
| Canadian in the United States | 730 | 844 | 646 | 1,873 | 538 | 1,303 | 1,508 | 1,154 | 3,345 | 961 |
| Total | ... | ... | *9,972* | *8,074* | *8,177* | ... | ... | *17,808* | *14,419* | *14,603* |
| **Barley** | | | | | | | | | | |
| Canadian in Canada | ... | ... | 3,315 | 2,973 | 5,018 | ... | ... | 6,907 | 6,193 | 10,454 |
| U. S. in Canada | ... | ... | 0 | 0 | 2 | ... | ... | 0 | 0 | 4 |
| U. S. in the United States (²) | 3,723 | 2,989 | 2,647 | 5,458 | 9,791 | 7,757 | 6,228 | 5,514 | 11,371 | 20,398 |
| Canadian in the United States | 0 | 23 | 42 | 329 | 277 | 0 | 47 | 87 | 685 | 578 |
| Total | ... | ... | *6,004* | *8,760* | *15,088* | ... | ... | *12,508* | *18,249* | *31,434* |
| **Oats:** | | | | | | | | | | |
| Canadian in Canada | ... | ... | 1,209 | 2,653 | 3,821 | ... | ... | 3,777 | 8,291 | 11,940 |
| U. S. in Canada | ... | ... | 17 | 7 | 79 | . . | ... | 52 | 21 | 248 |
| U. S. in the United States (²) | 3,700 | 4,218 | 3 767 | 2,270 | 4,657 | 11,562 | 13,182 | 11,771 | 7,093 | 14,552 |
| Canadian in the United States | 83 | 43 | 139 | 177 | 301 | 259 | 135 | 434 | 552 | 941 |
| Total | ... | ... | *5,132* | *5,104* | *8,858* | ... | ... | *16,034* | *15,957* | *27,681* |
| **Maize:** | | | | | | | | | | |
| U. S. in Canada | ... | ... | 1,447 | 1,654 | 2,618 | ... | ... | 2,584 | 2,954 | 4,675 |
| Argentine in Canada | ... | ... | ... | ... | 1 | ... | ... | ... | ... | 1 |
| South African in Canada | ... | ... | ... | ... | 1,141 | ... | ... | . . | . . | 2,037 |
| Australian in Canada | .. | ... | ... | ... | 0 | ... | ... | ... | ... | 0 |
| U. S. in the United States (²) | 22,476 | 21,956 | 22,450 | 33,216 | 15,423 | 40,135 | 39,207 | 40,090 | 59,314 | 27,541 |
| Total | .. | ... | ... | ... | *19,183* | ... | ... | ... | . . | *34,254* |

(¹) Friday for Canada, Saturday for the United States. — (²) As from August 1941, including 4 central and southwestern markets not reported previously.

## Cotton stocks on hand in the United States.

| Location | Oct 1941 | Sept 1941 | Aug. 1941 | Oct. 1940 | Oct. 1939 | Oct. 1941 | Sept. 1941 | Aug 1941 | Oct 1940 | Oct. 1939 |
|---|---|---|---|---|---|---|---|---|---|---|
| | Last day of month | | | | | | | | | |
| | thousand centals | | | | | thousand running bales (counting round as half bales) | | | | |
| In consuming establishments | 9,798 | 8,037 | 8,339 | 6,654 | 7,201 | 1,994 | 1,636 | 1,697 | 1,354 | 1,465 |
| In public storage and at compresses | 65,632 | 56,688 | 45,732 | 68,129 | 76,108 | 13,342 | 11,524 | 9 297 | 13,848 | 15,470 |
| Total | *75,430* | *64,725* | *54,071* | *74,783* | *83,309* | *15,336* | *13,160* | *10,994* | *15,202* | *16,935* |

## Commercial cereals and oilseeds in store in Argentina [1].

| Products and location | Oct 1941 | Sept. 1941 | Aug 1941 | Oct 1940 | Oct 1939 | Oct 1941 | Sept 1941 | Aug 1941 | Oct. 1940 | Oct. 1939 |
|---|---|---|---|---|---|---|---|---|---|---|
| | First day of month | | | | | | | | | |
| | thousand centals | | | | | thousand bushels | | | | |
| Wheat in the ports | 42,948 | 41,587 | 40,524 | 8,620 | [2] | 71,579 | 69,311 | 67,539 | 14,367 | [2] |
| Wheat in other positions | 42,349 | 49,652 | 55,500 | 11,310 | [2] | 70,580 | 82 751 | 92,497 | 18,849 | [2] |
| Total | *85,297* | *91,239* | *96,024* | *19,930* | [2] | *142,159* | *152,062* | *160,036* | *33 216* | [2] |
| Rye | 3,563 | 36,803 | 3,706 | 4,521 | 1,094 | 6,362 | 65,719 | 6,618 | 8,073 | 1,95 |
| Barley | 9,784 | 12,143 | 13,517 | 4,259 | 956 | 20,384 | 25,299 | 28,161 | 8,874 | 1,99 |
| Oats | 1,504 | 1,642 | 1,890 | 3,052 | 2,482 | 4,699 | 5,132 | 5,906 | 9,537 | 7,75 |
| Maize in the ports | 1,530 | 1,786 | 1,898 | 5,762 | 6,906 | 2,732 | 3,189 | 3,390 | 10,290 | 12,33 |
| Maize in other positions | 2,970 | 2.679 | 2,363 | 4,256 | 7,322 | 5,303 | 4,785 | 4,220 | 7,600 | 13,07 |
| Total | *4,500* | *4,465* | *4,261* | *10,018* | *14,228* | 8,035 | *7,974* | *7,610* | 17,890 | *25,40* |
| Canaryseed | 503 | 450 | 486 | 517 | 339 | 898 | 804 | 869 | 924 | 60 |
| Linseed in the ports | 14,372 | 11,782 | 11,606 | 2,886 | 1,547 | 25,664 | 21,039 | 20,724 | 5,154 | 2,76 |
| Linseed in other positions | 11,252 | 14,922 | 16,325 | 2,274 | 1,011 | 20,094 | 26,647 | 29,152 | 4,060 | 1,80 |
| Total | *25,624* | *26,704* | *27,931* | *5,160* | *2,558* | *45,758* | *47,686* | *49,876* | *9,214* | *4,56* |
| Sunflowerseed | 6,250 | 6,438 | 5,955 | 2,414 | 864 | 22,321 | 22,991 | 21,267 | 8,621 | 3,08 |

(1) Since July 1941 stocks the property of the "Junta Reguladora de Granos" in the hands of merchants or industrialists are included in the data for wheat, rye, linseed and sunflowerseed — (2) Figures for wheat in store withheld by Governmental order

# PRICES BY PRODUCTS.

## A) — Spot quotations. [1]

| Description | Nov 14, 1941 | Nov 7, 1941 | Oct 31, 1941 | Oct 24, 1941 | Oct 17, 1941 | Monthly averages: Oct 1941 | Monthly averages: Nov 1940 | Monthly averages: Nov 1939 | Yearly averages: 1940-41 [2] | Yearly averages: 1939-40 [2] |
|---|---|---|---|---|---|---|---|---|---|---|
| **Wheat** | | | | | | | | | | |
| Chicago No 2 Hard Winter (cents p 60 lb) | | | | | | | 90 | 90 7/8 | 90 3/4 | 92 7/8 |
| Minneapolis (cents per 60 lb) | | | | | | | | | | |
| No 1 Northern | 108 1/8 | 110 1/8 | 107 | 105 7/8 | 98 1/8 | 104 5/8 | 85 1/8 | 88 | 87 1/8 | 91 1/8 |
| No 2 Amber Durum | 98 3/4 | 101 1/4 | 95 5/8 | 98 5/8 | 93 1/2 | 98 /8 | 76 | 79 | 79 3/8 | 80 3/4 |
| New York (cents p 60 lb) | | | | | | | | | | |
| No 1 Manitoba Northern (c i f) | 89 1/8 | 90 | 89 1/8 | | 88 5/4 | | 84 3/4 | 84 3/8 | 88 1/4 | 92 1/4 |
| No 2 Hard Winter (f o b) | 135 1/8 | 137 1/4 | 134 3/8 | | 124 3/8 | | 107 1/2 | 111 | 106 1/2 | 112 1/4 |
| Buenos Aires (a) No 2 Hard 78 kg per hl (paper pesos p 100 kg) | 6 90 | 7 10 | 7 15 | 7 15 | 7 00 | 7 03 | * 6 60 | 6 31 | 6 92 | 7 66 |
| **Rye** | | | | | | | | | | |
| Minneapolis No 2 rye (cents p 56 lb) | 67 1/8 | 70 | 64 1/4 | 61 3/4 | 56 1/2 | 62 5/4 | 49 3/8 | 50 5/ | 50 7/8 | 56 1/8 |
| New York No 2 (c i f, cents p 56 lb) | 82 3/8 | 85 1/8 | 80 1/2 | | 76 1/2 | | 61 7/8 | 72 3/4 | 63 7/8 | 77 5/8 |
| **Barley** | | | | | | | | | | |
| Chicago Feeding (on sample cents p 48 lb) | | | | | | | 43 5/8 | 38 3/8 | 46 5/8 | 42 1/4 |
| Minneapolis No 2 Feeding (cents p 48 lb) | n q | n q | n q | n q | n q | n q | 41 3/4 | 43 1/2 | * 41 1/4 | 45 |
| New York No 2 (cents p 48 lb) | 71 7/8 | 76 3/8 | 74 5/8 | | 69 3/4 | | 66 1/4 | 59 /8 | 65 1/8 | 62 3/8 |
| **Oats** | | | | | | | | | | |
| Chicago No White (cents p r 32 lb) | | | | | | | 39 3 | 39 1 | 37 1/4 | 39 |
| Buenos Aires (a) No White 4 kg p hl (paper pesos per 100 kg) | 4 60 | 4 60 | 4 60 | 4 60 | 4 60 | 4 58 | 3 84 | 5 21 | 4 07 | * 5 17 |
| **Maize.** | | | | | | | | | | |
| Chicago No 3 Yellow (cents p 56 lb) | | | | | | | 63 3/8 | 49 3/4 | 64 1/2 | 53 1/8 |
| New York No 2 Mixed Western (cents p 56 lb) | 87 1/2 | 89 5/8 | 88 1/2 | | 84 1/4 | | 81 1/2 | 64 3/4 | 79 7/8 | 72 3/4 |
| **Linseed** | | | | | | | | | | |
| Buenos Aires (a) No 1 4 % impurities (paper pesos p 100 kg) | 10 65 | 11 00 | 11 00 | 10 65 | 10 70 | 10 48 | * 9 27 | 16 30 | * 13 64 | 15 12 |
| London (c i f, shipping current or following month £ per long ton) | | | | | | | | | | |
| La Plata | 13- 5-0 | | 12-12-6 | 12- 3-9 | 12- 3-9 | 12- 5-6 | *10-11-3 | *15- 5-0 | *14- 2-0 | *12- 2-3 |
| Bombay | 20-10-0 | | 19-15-0 | 19-15-0 | 19-15-0 | 19- 3-0 | 17-16-0 | *18-18-9 | 18-11-9 | *14-10-3 |
| Minneapolis No 1 Northern (cts p 56 lb) | 180 | 181 1/8 | 180 | 174 3/4 | 173 1/8 | 179 1/4 | 157 3/4 | 179 3/4 | 178 | 180 |
| **Cotton.** | | | | | | | | | | |
| New Orleans Middling (cents p lb) | 16 39 | 16 42 | 16 00 | (4) 16 08 | 15 93 | 16 26 | 9,82 | n 9 38 | 11 06 | n 10 03 |
| New York Middling (cents per lb) | (3) 17 25 | 17 20 | 17 07 | (4) 17 06 | 16,95 | 17 27 | 10 15 | n 9 71 | 11 55 | n 10.34 |

* Indicates that the product was not quoted during part of the period under review — n q = *not quoted* — n = *nominal.* — (a) Thursday prices

(1) In relation to Government price fixing, numerous series are omitted from this table, notes concerning them are given on page 413 et seq of the August and on page 456 et seq of the September issue of the Crop Report — (2) Commercial season: August July, except for maize May-April, and for linseed calendar year — (3) Quotation of November 13 — (4) Quotation of October 25

## B) — Quotations for future delivery.

| Description | Nov 14, 1941 | Nov 7, 1941 | Oct 31, 1941 | Oct 24, 1941 | Oct 17, 1941 | Monthly averages: Oct 1941 | Nov 1940 | Nov 1939 | Nov 1938 | Nov 1937 |
|---|---|---|---|---|---|---|---|---|---|---|
| **Wheat.** | | | | | | | | | | |
| Winnipeg (cents p 60 lb) | | | | | | | | | | |
| delivery October | — | — | 72 3/8 | 72 5/8 | 72 1/4 | 73 /8 | — | — | — | — |
| December | 73 1/4 | 73 3/4 | 73 | 73 1/2 | 73 3/8 | 74 /8 | 72 1/4 | 70 1/2 | 58 1/2 | 111 5/8 |
| May | 76 7/8 | 77 3/8 | 76 5/8 | 77 1/4 | 77 1/4 | 78 1/4 | 76 1/2 | 75 1/4 | 61 3/8 | 110 |
| „ July | 78 1/8 | 79 | — | — | — | — | 78 1/8 | 76 3/4 | 62 1/8 | * 106 5/8 |
| Chicago (cents p 60 lb) | | | | | | | | | | |
| delivery December | 115 | 117 | 114 1/ | 116 5/8 | 111 1/4 | 116 1/2 | 87 1/ | 87 3/4 | 63 3/8 | 90 1/2 |
| „ May | 119 7/8 | 122 1/2 | 119 /8 | 121 3/8 | 115 3/4 | 119 3/8 | 86 3/8 | 86 | 65 3/4 | 90 5/8 |
| July | 120 3/8 | 123 3/8 | — | 122 5/8 | 115 1/2 | 119 3/4 | 82 3/8 | 84 | 65 5/8 | 85 5/8 |
| Buenos Aires (paper pesos p 100 kg) | | | | | | | | | | |
| delivery November | — | — | 6.80 | 7.08 | 6.87 | 6.89 | * 6.52 | * 6.31 | 6.13 | — |
| December | 6.89 | 7.16 | 7.16 | 7.25 | 7.05 | 7.08 | 6.58 | — | * 6.18 | 11.81 |
| January | 7.09 | 7.31 | — | — | — | — | — | — | — | — |
| **Rye.** | | | | | | | | | | |
| Winnipeg (cents p 56 lb) | | | | | | | | | | |
| delivery October | — | — | 55 3/8 | 58 7/8 | 53 1/8 | 57 3/8 | — | — | — | — |
| „ December | 57 /8 | 59 1/4 | 55 1/2 | 54 1/2 | 54 1/8 | 57 1/8 | 46 3/8 | 57 1/2 | 38 3/4 | 73 3/4 |
| „ May | 60 7/8 | 62 3/8 | 58 1/2 | 57 1/2 | 56 3/8 | 59 5/8 | 49 3/8 | 60 1/8 | 40 7/8 | 75 1/2 |
| „ July | 61 1/2 | 63 | — | — | — | — | - | 59 /8 | — | — |
| Chicago (cents p 56 lb) | | | | | | | | | | |
| delivery December | 65 | 67 3/4 | 63 1/2 | 65 | 61 1/8 | 67 | 44 7/8 | 53 1/4 | 41 5/8 | 69 5/8 |
| „ May | 71 1/2 | 74 1/4 | 69 7/8 | 71 1/4 | 67 1/2 | 73 1/4 | 49 1/4 | 54 1/2 | 44 3/8 | 69 |
| „ July | 73 3/8 | 76 | 71 7/8 | 73 1/8 | 69 1/8 | 75 1/8 | 50 1/4 | 54 5/8 | 45 | 65 1/8 |
| **Barley.** | | | | | | | | | | |
| Winnipeg (cents p 48 lb) | | | | | | | | | | |
| delivery October | — | — | 56 | 55 3/4 | 54 /8 | 56 /8 | — | — | — | — |
| „ December | 56 1/8 | 57 1/2 | 55 1/4 | 55 1/8 | 55 | 56 1/8 | 43 3/4 | 43 1/8 | 34 5/8 | 57 1/4 |
| „ May | 57 3/8 | 58 1/4 | 56 | 56 3/4 | 55 1/8 | 56 5/8 | 42 7/8 | 45 1/4 | 35 5/8 | 56 1/2 |
| „ July | 56 3/8 | 57 1/8 | — | - | — | — | * 41 7/8 | 45 3/8 | — | — |
| Minneapolis (cents p 48 lb) | | | | | | | | | | |
| delivery December | * | | | | | | 40 3/4 | 36 1/2 | 31 1/2 | 45 1/2 |
| „ May | | | | | | | 41 1/8 | 38 3/8 | 34 3/8 | 45 1/4 |
| **Oats.** | | | | | | | | | | |
| Winnipeg (cents p 34 lb) | | | | | | | | | | |
| delivery October | — | — | 46 5/8 | 45 1/2 | 45 5/8 | 46 3/4 | — | — | — | — |
| „ December | 43 3/4 | 44 3/4 | 45 3/4 | 45 5/8 | 44 1/2 | 45 5/8 | 32 /8 | 32 5/8 | 27 1/8 | 44 3/4 |
| „ May | 44 7/8 | 45 1/2 | 45 3/8 | 45 1/2 | 43 1/2 | 44 7/8 | 32 1/8 | 34 1/8 | 28 | 43 3/8 |
| „ July | 44 1/8 | — | — | — | — | — | 31 | 34 | * 27 7/8 | — |
| Chicago (cents p 32 lb) | | | | | | | | | | |
| delivery December | 50 | 51 1/8 | 49 3/8 | 48 1/8 | 46 1/8 | 49 1/8 | 37 3/8 | 37 1/2 | 25 1/8 | 30 1/8 |
| „ May | 52 3/8 | 53 1/4 | 51 3/4 | 50 1/2 | 48 5/8 | 51 5/8 | 36 | 35 7/8 | 26 1/8 | 29 3/4 |
| „ July | 51 | 52 | 50 1/8 | 49 | 48 1/8 | 50 5/8 | 32 3/4 | 32 3/8 | 26 1/4 | 28 7/8 |

* Indicates that the product was not quoted during part of the period under review

| Description | Nov. 14, 1941 | Nov 7, 1941 | Oct. 31, 1941 | Oct. 24, 1941 | Oct 17, 1941 | Monthly Averages Oct. 1941 | Nov. 1940 | Nov 1939 | Nov. 1938 | Nov. 1937 |
|---|---|---|---|---|---|---|---|---|---|---|
| **Maize.** | | | | | | | | | | |
| Chicago (cents p. 56 lb.): | | | | | | | | | | |
| delivery December | 74 7/8 | 78 1/8 | 77 1/2 | 76 3/8 | 74 1/8 | 74 1/4 | 62 1/2 | 51 | 47 | 54 5/8 |
| „ May | 80 5/8 | 84 1/4 | 83 3/4 | 82 3/8 | 80 1/4 | 83 | 62 3/4 | 53 | 50 3/4 | 57 3/8 |
| „ July | 82 3/8 | 86 1/8 | 85 5/8 | 84 1/4 | 81 7/8 | 84 7/8 | 62 7/8 | 53 1/2 | 51 3/4 | 58 3/8 |
| **Linseed.** | | | | | | | | | | |
| Winnipeg (cents per 56 lb.): | | | | | | | | | | |
| delivery October | — | — | 146 | 147 1/4 | 149 3/4 | 151 3/8 | — | — | — | — |
| „ December | 147 3/4 | 152 1/4 | 146 3/4 | 146 1/4 | 147 | 147 3/4 | 130 5/8 | 157 5/8 | 135 | 173 1/8 |
| „ May | 149 1/2 | 154 1/4 | 149 3/4 | 147 3/8 | 146 1/2 | 148 1/8 | 134 7/8 | 160 3/4 | 134 1/2 | 173 |
| „ July | 150 | 154 | — | — | — | — | 136 1/8 | — | — | — |
| Duluth (cents p. 56 lb.): | | | | | | | | | | |
| delivery December | ... | ... | ... | ... | ... | ... | n. 155 1/4 | 172 1/4 | 173 1/4 | 195 1/8 |
| Buenos Aires (paper pesos p. 100 kg.): | | | | | | | | | | |
| delivery November | — | — | 11 12 | 10.72 | 10.88 | 10.71 | — | * 16.56 | * 13.02 | — |
| „ Decmber | 10.61 | 11.23 | 11.43 | 11.02 | 11.17 | 10.98 | * 9.11 | — | — | — |
| „ January | 10.87 | 11.51 | — | — | — | — | * 9.25 | — | — | — |

* Indicates that the product was not quoted during part of the period under review.

# INDEX-NUMBERS OF PRICES OF AGRICULTURAL PRODUCTS AND OF COMMODITIES BOUGHT BY THE FARMER

| Description | Oct. 1941 | Sept. 1941 | Aug. 1941 | July 1941 | June 1941 | May 1941 | Oct 1940 | Oct. 1939 | Year 1940-41 ([2]) | Year 1939-40 ([2]) |
|---|---|---|---|---|---|---|---|---|---|---|
| **Germany** | | | | | | | | | | |
| (Statistisches Reichsamt; products sold by farmers) Average for corresponding months 1909-10/1913-14 = 100. | | | | | | | | | | |
| Cereals | 112 | 111 | 113 | 102 | 111 | 110 | 110 | 109 | 111 | 111 |
| Edible potatoes | 108 | 134 | 171 | 173 | 115 | 120 | 108 | 108 | 118 | 115 |
| *Plant products* | 110 | 115 | 127 | 131 | 112 | 113 | 109 | 109 | 113 | 112 |
| Meat animals | 98 | 99 | 101 | 106 | 107 | 106 | 95 | 95 | 99 | 98 |
| Livestock products (butter and eggs) | 118 | 123 | 128 | 137 | 142 | 137 | 117 | 105 | 126 | 118 |
| *Livestock and livestock products* | 104 | 106 | 109 | 116 | 119 | 116 | 101 | 98 | 107 | 104 |
| *Total agricultural products* | 106 | 109 | 114 | 119 | 118 | 116 | 104 | 102 | 109 | 106 |
| **Germany** | | | | | | | | | | |
| (Statistisches Reichsamt, wholesale products) 1913 = 100. | | | | | | | | | 1940 | 1939 |
| Agricultural products | 111.4 | 112.8 | 114.4 | 113.5 | 114.0 | 112.9 | 110.2 | 107.5 | 110.7 | 107.9 |
| Fertilizers | 53.2 | 52.6 | 52.0 | 51.0 | 49.0 | 53.7 | 53.2 | 52.9 | 53.1 | 54.6 |
| Consumption goods ([1]) | 146.8 | 146.5 | 142.6 | 146.5 | 146.6 | 146.9 | 144.9 | 136.3 | 141.6 | 135.9 |
| *Wholesale products in general* | 112.2 | 112.5 | 112.8 | 112.4 | 112.4 | 112.2 | 110.6 | 107.1 | 110.0 | 106.9 |
| **Argentina** | | | | | | | | | | |
| (Banco Central de la República Argentina) 1926 = 100. | | | | | | | | | | |
| Cereals and linseed | 61.6 | 60.7 | 60.4 | 60.5 | 59.9 | 59.7 | 49.6 | 80.3 | 68.8 | 77.6 |
| Meat | 104.2 | 108.2 | 109.1 | 106.9 | 102.4 | 101.6 | 97.9 | 103.9 | 102.9 | 94.5 |
| Hides and skins | 107.0 | 100.8 | 93.3 | 97.0 | 100.8 | 104.1 | 87.4 | 106.8 | 92.1 | 89.2 |
| Wool | 123.8 | 113.1 | 110.2 | 110.5 | 117.6 | 106.1 | 98.7 | 135.1 | 116.6 | 103.9 |
| Dairy products | 111.6 | 122.6 | 105.5 | 111.1 | 102.5 | 90.6 | 85.1 | 92.2 | 82.0 | 83.0 |
| Forest products | 121.5 | 121.5 | 121.5 | 121.5 | 121.5 | 121.5 | 111.7 | 109.5 | 112.8 | 104.2 |
| *Total agricultural products* | 78.8 | 77.6 | 76.4 | 76.4 | 76.2 | 75.0 | 65.0 | 90.7 | 80.4 | 83.6 |
| *Non-agricultural commodities* | 185.9 | 181.2 | 174.0 | 163.6 | 155.8 | 150.0 | 137.0 | 126.2 | 135.4 | 114.8 |
| *Wholesale products in general* | 162.9 | 159.0 | 153.1 | 144.9 | 138.7 | 133.9 | 121.6 | 118.7 | 123.4 | 108.2 |
| **Chili** | | | | | | | | | | |
| (Dirección General de Estadistica) 1913 = 100 | | | | | | | | | | |
| Cereals | ... | 576.1 | 566.6 | 556.4 | 540.6 | 522.8 | 492.5 | 446.2 | 474.4 | 441.1 |
| Other plant products | ... | 671.6 | 659.1 | 648.9 | 629.2 | 614.3 | 579.0 | 431.0 | 506.8 | 396.9 |
| Meat animals | ... | 571.8 | 497.3 | 440.4 | 420.7 | 397.3 | 456.8 | 423.3 | 414.1 | 366.1 |
| Meat | ... | 502.8 | 493.7 | 408.3 | 396.6 | 354.7 | 416.6 | 386.9 | 376.7 | 303.4 |
| *Total agricultural products* | ... | 616.2 | 598.9 | 576.8 | 559.0 | 539.8 | 524.8 | 430.5 | 475.0 | 400.7 |
| *Domestic industrial products* | ... | 509.6 | 500.9 | 496.9 | 493.4 | 489.0 | 483.2 | 443.4 | 473.4 | 433.6 |
| *Wholesale products in general* | ... | 709.8 | 675.4 | 643.2 | 625.5 | 609.9 | 574.5 | 523.3 | 553.7 | 496.7 |

([1]) Household goods of all kinds, and clothing. — ([2]) Agricultural year: July 1-June 30.

| Description | Oct 1941 | Sept 1941 | Aug 1941 | July 1941 | June 1941 | May 1941 | Oct 1940 | Oct 1939 | Year 1940 | Year 1939 |
|---|---|---|---|---|---|---|---|---|---|---|
| **Denmark** | | | | | | | | | | |
| (Det landokonomiske Driftsbureau) Average 1909 to 1914 = 100 | | | | | | | | | | |
| **Cereals** | | | 207 | 207 | 207 | 207 | 207 | 141 | 179 | 118 |
| Total plant products (1) | | | 246 | 246 | 246 | 246 | 238 | 145 | 210 | 121 |
| **Dairy products** | | | 216 | 221 | 221 | 221 | 188 | 119 | 156 | 119 |
| Total animal products (1) | | | 225 | 222 | 221 | 216 | 187 | 132 | 161 | 131 |
| *Total agricultural products* | | | 226 | 224 | 222 | 218 | 191 | 133 | 165 | 130 |
| **Fertilisers** | | | 170 | 169 | 169 | 169 | 160 | 102 | 134 | 100 |
| **Concentrated feedingstuffs** | | | — | — | — | — | 210 | 176 | 187 | 132 |
| **Seeds** | | | 238 | 238 | 238 | 238 | 141 | 96 | 141 | 96 |
| *Total products purchased* | | | — | — | 204 | 204 | 193 | 153 | 171 | 122 |
| **United States** | | | | | | | | | | |
| (Bureau of Agricultural Economics) Average 1909 10 to 1913 14 = 100 | | | | | | | | | | |
| A Uncorrected for seasonal variation | | | | | | | | | | |
| **Cereals** | 101 | 106 | 99 | 98 | 96 | 93 | 80 | 77 | 85 | 72 |
| **Cotton and cottonseed** | 144 | 150 | 128 | 121 | 107 | 98 | 78 | 74 | 81 | 73 |
| **Fruits** | 107 | 89 | 100 | 93 | 97 | 89 | 79 | 73 | 79 | 77 |
| **Meat animals** | 157 | 166 | 158 | 154 | 144 | 138 | 112 | 112 | 107 | 110 |
| **Dairy products** | 145 | 140 | 135 | 132 | 126 | 124 | 116 | 112 | 113 | 104 |
| **Chickens and eggs** | 146 | 141 | 130 | 127 | 118 | 107 | 112 | 108 | 96 | 94 |
| **Miscellaneous** | 144 | 131 | 128 | 107 | 98 | 93 | 100 | 94 | 101 | 93 |
| *Total agricultural products* | 139 | 139 | 131 | 125 | 118 | 112 | 99 | 97 | 98 | 92 |
| **Commodities bought for use in living and production** | 136 | 133 | 131 | 129 | 126 | 125 | 122 | 122 | 122 | 121 |
| *Prices, interest and taxes paid by farmers* | 138 | 137 | 131 | 133 | 130 | 130 | 127 | 128 | 127 | 127 |
| *Agricultural wages* (2) | 165 | | — | 160 | | | 129 | 126 | 124 | 122 |
| B Corrected for seasonal variation | | | | | | | | | | |
| **Cereals** | 104 | 109 | 99 | 97 | 92 | 91 | 82 | 80 | — | — |
| **Cotton and cottonseed** | 147 | 146 | 124 | 117 | 104 | 95 | 79 | 75 | — | — |
| **Fruits** | 110 | 95 | 99 | 84 | 80 | 79 | 83 | 75 | — | — |
| **Truck crops (market garden crops)** | 164 | 145 | 133 | 130 | 146 | 146 | 99 | 128 | — | — |
| **Meat animals** | 157 | 164 | 154 | 150 | 142 | 135 | 113 | 113 | — | — |
| **Dairy products** | 143 | 143 | 141 | 139 | 132 | 128 | 115 | 111 | — | — |
| **Chickens and eggs** | 124 | 130 | 132 | 135 | 136 | 121 | 100 | 96 | — | — |
| **Miscellaneous** | 139 | 132 | 120 | 102 | 95 | 91 | 98 | 94 | — | — |
| *Total agricultural products* | 138 | 138 | 129 | 123 | 117 | 112 | 98 | 96 | — | |
| *Agricultural wages* (2) | 160 | — | — | 155 | — | — | 125 | 122 | — | — |
| **United States** | | | | | | | | | | |
| (Bureau of Labor) 1926 = 100 | | | | | | | | | | |
| **Grains** | 81.4 | 95.3 | 79.6 | 76.3 | 75.9 | 74.5 | 65.4 | 61.6 | 67.9 | 58.7 |
| **Livestock and poultry** | 94.5 | 101.1 | 99.0 | 98.9 | 93.0 | 88.0 | 70.6 | 70.6 | 69.1 | 72.2 |
| **Other farm products** | 88.9 | 86.0 | 82.0 | 79.9 | 76.6 | 69.5 | 63.8 | 66.1 | 66.2 | 62.6 |
| *Total agricultural products* | 90.0 | 91.0 | 87.4 | 85.8 | 82.1 | 76.4 | 66.4 | 67.1 | 67.6 | 65.4 |
| **Agricultural implements** | 93.8 | 93.4 | 92.9 | 92.5 | 92.4 | 92.4 | 92.5 | 93.4 | 92.8 | 93.4 |
| **Fertilizer materials** | 77.3 | 76.6 | 75.3 | 74.0 | 69.9 | 71.1 | 68.1 | 70.6 | 69.4 | 70.4 |
| **Mixed fertilizers** | 77.5 | 77.1 | 77.1 | 77.0 | 73.8 | 73.2 | 74.2 | 72.6 | 73.8 | 73.0 |
| **Cattle feed** | 112.9 | 126.2 | 108.8 | 104.2 | 88.9 | 81.8 | 80.1 | 82.9 | 87.6 | 82.0 |
| *Non-agricultural commodities* | 92.8 | 91.9 | 90.7 | 89.3 | 88.0 | 86.6 | 81.3 | 82.0 | 80.8 | 79.6 |
| *Wholesale products in general* | 92.4 | 91.8 | 90.3 | 88.8 | 87.1 | 84.9 | 78.7 | 79.4 | 78.5 | 77.2 |

(1) Including unspecified products — (2) 1910 1914 = 100

| Description | Oct 1941 | Sept. 1941 | Aug 1941 | July 1941 | June 1941 | May 1941 | Oct 1940 | Oct 1939 | Year 1940 | Year 1939 |
|---|---|---|---|---|---|---|---|---|---|---|
| **Hungary** | | | | | | | | | | |
| (Central Royal Bureau of Statistics) 1929 = 00. | | | | | | | | | | |
| Cereals | ... | 132.1 | 132.1 | 130.5 | 105.6 | 105.6 | 102.3 | 85.1 | 96.2 | 85.9 |
| Total raw plant products (1) | ... | 132.6 | 131.9 | 129.0 | 113.6 | 114.6 | 112.8 | 80.0 | 101.9 | 79.5 |
| at animals, meat and lard | ... | 134.2 | 132.9 | 129.7 | 126.4 | 124.8 | 99.1 | 67.9 | 87.1 | 65.1 |
| Total livestock products (1) | ... | 125.3 | 123.1 | 120.8 | 112.9 | 112.4 | 98.6 | 66.8 | 85.1 | 65.6 |
| *Total agricultural products* | .. | 130.3 | 129.2 | 126 4 | 113.4 | 113.4 | 108.3 | 75.9 | 96.7 | 75.2 |
| *Products of agricultural industries* | ... | 141.0 | 140.5 | 138.2 | 108.5 | 107.9 | 106 6 | 93 8 | 101.0 | 93.9 |
| *Industrial raw materials and products.* | ... | 132.3 | 126.8 | 120.4 | 118.6 | 117 3 | 105 5 | 94.5 | 102.3 | 93.1 |
| *Wholesale products in general.* | ... | 107.0 | 105.7 | 125.3 | 115.9 | 115.4 | 107.0 | 87.5 | 100.3 | 86.3 |
| **Norway** | | | | | | | | | | |
| (Landbrukshöiskole) Average 1909 to 1914 = 100 | | | | | | | | | 1940-41 (2) | 1939-40 (2) |
| Plant products | .. | | .. | 226 | 226 | 226 | 209 | 181 | 229 | 168 |
| Pork | ... | . | .. | 231 | 231 | 213 | 162 | 153 | 172 | 144 |
| Other meat | . | .. | ... | 270 | 270 | 270 | 221 | 176 | 226 | 172 |
| Dairy products | | .. | ... | 252 | 246 | 241 | 229 | 168 | 215 | 173 |
| Eggs | ... | .. | ... | 206 | 206 | 196 | 154 | 145 | 161 | 122 |
| Livestock products | ... | .. | ... | 249 | 245 | 238 | 213 | 165 | 206 | 165 |
| *Total agricultural products* | ... | .. | ... | 244 | 241 | 235 | 212 | 169 | 211 | 166 |
| Superphosphate, 16 % | .. | . | .. | 184 | 184 | 184 | 203 | 110 | 192 | 141 |
| Potash salt, 40 % | ... | . | ... | 118 | 118 | 118 | 122 | 100 | 117 | 109 |
| Nitrate of lime, 15 1/2 % | . | . | ... | 83 | 83 | 83 | 82 | 75 | 82 | 78 |
| Feedingstuffs for milk production | .. | . | . | 246 | 246 | 246 | 246 | 164 | 227 | 167 |
| Feedingstuffs for pork production | .. | .. | ... | — | — | — | — | 157 | — | 157 |
| Building materials | ... | .. | .. | 233 | 233 | 229 | 210 | 180 | 210 | 183 |
| Machinery and implements | ... | . | .. | 302 | 302 | 302 | 261 | 210 | 250 | 219 |
| Total production goods bought | ... | . | .. | .. | ... | ... | 225 | 166 | 214 | 174 |
| Consumption goods bought | ... | . | ... | 273 | 272 | 267 | 240 | 180 | 232 | 184 |
| *Total goods for production and consumption bought* | ... | ... | .. | ... | ... | ... | 232 | 172 | 222 | 178 |
| *Agricultural wages.* | ... | . | .. | ... | ... | ... | 230 | 215 | 238 | 215 |
| **Norway** | | | | | | | | | | |
| (Kgl. Selskap for Norges Vel) Average 1909-1914 = 100. | | | | | | | | | | |
| Cereals | 257 | 257 | 213 | 213 | 213 | 213 | 213 | 170 | 195 | 168 |
| Potatoes | 263 | 299 | 319 | 250 | 250 | 250 | 208 | 217 | 282 | 186 |
| Pork | 248 | 248 | 248 | 248 | 247 | 230 | 163 | 154 | 177 | 141 |
| Other meat | 265 | 265 | 265 | 265 | 265 | 265 | 215 | 168 | 217 | 168 |
| Dairy products | 219 | 219 | 219 | 219 | 219 | 219 | 218 | 188 | 208 | 186 |
| Eggs | 233 | 233 | 228 | 217 | 217 | 206 | 162 | 157 | 169 | 129 |
| Concentrated feedingstuffs | 214 | 214 | 214 | 214 | 214 | 214 | 218 | 159 | 285 | 163 |
| Maize | — | — | — | — | — | — | 205 | 168 | 194 | 165 |
| Fertilizers | 123 | 123 | 123 | 123 | 123 | 165 | 138 | 90 | 127 | 101 |

(1) Including unspecified products. — (2) Agricultural year: April 1 to March 31.

| Description | Oct 1941 | Sept 1941 | Aug 1941 | July 1941 | June 1941 | May 1941 | Oct 1940 | Oct 1939 | Year 1940-41 (1) | Year 1939-40 (1) |
|---|---|---|---|---|---|---|---|---|---|---|
| **Netherlands** | | | | | | | | | | |
| (Bureau of Agriculture) Average 1924-25 to 1928-29 = 100 | | | | | | | | | | |
| Plant products | 89 | 90 | 89 | 87 | 86 | 83 | 78 | 68 | 79 | 69 |
| Livestock products | 95 | 99 | 103 | 106 | 102 | 104 | 81 | 70 | 89 | 71 |
| *Total agricultural products* | 93 | 97 | 100 | 102 | 98 | 100 | 80 | 69 | 87 | 70 |
| *Agricultural wages* | | | | | 86 | 86 | 86 | 75 | 86 | 77 |
| **Switzerland** | | | | | | | | | 1940 | 1939 |
| (Schweizerischer Bauernverband) 1914 = 100 | | | | | | | | | | |
| Slaughter cattle | 175 | 172 | 167 | 164 | 161 | 163 | 135 | 129 | 128 | 115 |
| Slaughter pigs | 224 | 223 | 221 | 221 | 222 | 205 | 174 | 143 | 154 | 129 |
| Milk (base price) | 147 | 147 | 147 | 147 | 147 | 147 | 135 | 117 | 135 | 122 |
| *Total agricultural products* | 177 | 174 | 174 | 172 | 170 | 166 | 149 | 128 | 144 | 126 |
| Feedingstuffs (2) | | 202 | 203 | 203 | 202 | 190 | 163 | 121 | 146 | 113 |
| Fertilizers (2) | | 129 | 129 | 129 | 126 | 126 | 124 | 109 | 113 | 101 |
| *Wholesale products in general* (2) | 192 8 | 191 0 | 189 4 | 187 5 | 184 4 | 181 1 | 155 5 | 120 1 | 143 0 | 111 2 |

(1) Agricultural year July 1 to June 30 — (2) Index numbers calculated by the Bundesamt für Industrie Gewerbe und Arbeit, base July 1914

Prof Ugo Papi, *Segretario generale dell'Istituto, Direttore responsabile.*

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# MONTHLY CROP REPORT AND AGRICULTURAL STATISTICS

*The following explanations refer to crop conditions quoted in the crop notes and in the tables. — Crop condition according to the system of the country: Germany, Bohemia and Moravia (Protectorate); Hungary: 1 = excellent, 2 = good, 3 = average, 4 = poor, 5 = very poor, Finland: 8 = very good, 6 = above the average, 5 = average; France: 100 = excellent, 70 = good, 60 = fairly good, 50 = average, 30 = poor; Romania and Sweden: 5 = excellent, 4 = good, 3 = average, 2 = poor, 1 = very poor; Netherlands: 90 = excellent, 70 = good, 60 = fairly good, 50 = below awerage; Portugal: 100 = excellent, 80 = good, 60 = average, 40 = poor, 20 = very poor; Switzerland: 100 = excellent, 90 = very good, 75 = good, 60 = fairly good, 50 = average, 40 = rather poor, 30 = poor, 10 = very poor; U. S. S. R.: 5 = good, 4 = above the average, 3 = average, 2 = below average, 1 = poor; Canada: 100 = crop condition promising a yield equivalent to the average yield of a long series of years; United States: 100 = crop condition which promises a normal yield; Egypt: 100 = crop condition which promises a yield equal to the average yield of the last five years. — For other countries the system of the Institute is employed: 100 = crop condition which promises a yield equal to the average of the last ten years.*

NOTE: *The countries are listed throughout by continents (Europe, followed by the U. S. S. R., America, Asia, Africa and Oceania) in the French alphabetical order. In the tables the Northern Hemisphere precedes the Southern Hemisphere.*

## *VEGETAL PRODUCTION*

### CURRENT INFORMATION FROM VARIOUS COUNTRIES ON WHEAT, RYE, BARLEY AND OATS.

*Bulgaria* The Government recently issued a decree whereby the prices of all cereals such as wheat, rye, barley, oats and maize, i. e., of cereals that are subject to State monopoly, cannot be increased until August 1, 1942. The decree covers also all derivatives from these products.

The Government has recently approved a plan for spring crops in general This plan has been co-ordinated with that previously adopted for winter crops. Among other things, the plan foresees areas to be sown to spring cereals during the agricultural year 1941-42 in the different administrative districts of the country. The work will be directed and controlled by fonctionnaires of the Ministry of agriculture and by the mayors of the communes.

*Croatia:* The Croatian Government has established a severe State control over all sowings in general and sowings of cereals in particular, which are produced in the country or imported and exported. The sale of imperfect seeds is forbidden, and seeds of fine quality must be put on sale only in sealed bags The creation of a special Committee is also foreseen that will be charged with the task of regulating the seed market. A Company for the cleaning and selection of seeds will also be organised. All seed producers will be united in one Association which will be placed under State control.

*Spain:* Sowings of cereals were practically over at the middle of November. Weather was quite favourable during the second half of the month. Abundant rains fell after a long drought. Germination is generally regular, though somewhat delayed.

## *Area and Production of Cereals*

| Countries | Area 1941 | Area 1940 | Area Aver 1935 to 1939 | Area % 1941: 1940 = 100 | Area % 1941: Aver = 100 | Production 1941 | Production 1940 | Production Aver. 1935 to 1939 | Production 1941 | Production 1940 | Production Aver. 1935 to 1939 | Production % 1941: 1940 = 100 | Production % 1941: Aver. = 100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 000 acres | | | | | 000 centals | | | 000 bushels | | | | |
| **WHEAT** | | | | | | | | | | | | | |
| Belgium. | 439 | (w) 354 | 394 | — | 111 4 | . . | ... | 9,691 | .. | ... | 16,151 | . . | ... |
| Denmark | 203 | 199 | 316 | 101.8 | 64 1 | . . | 4,094 | 8,617 | ... | 6,823 | 14,361 | ... | ... |
| Spain. | 9,445 | 8,735 | (1)8,639 | 108.1 | 109 3 | 65,377 | 47,648 | 63 270 | 108,959 | 79,412 | (1)105,448 | 137.2 | 103.3 |
| Finland | 326 | 349 | 264 | 93 5 | 123 6 | 3,735 | 3,939 | 4,208 | 6,224 | 6 565 | 7 013 | 94.8 | 88,8 |
| Ireland. | 491 | 305 | 225 | 160 9 | 218.4 | .. | 7,011 | 4,613 | ... | 11,685 | 7,689 | ... | ... |
| Italy. | . . | 12,566 | 12,639 | ... | .. | 157,631 | 156,754 | 167,713 | 262,713 | 261,251 | 279,517 | 100.6 | 94.0 |
| Netherlands. | 339 | 331 | 338 | 102 2 | 100,2 | . | ... | 9,113 | ... | ... | 15,188 | .. | . |
| Romania. | (2)5,807 | (2)5,014 | 9,054 | 115,8 | — | (2)54,124 | (2)30,225 | 84,491 | (2)90 204 | (2)50,375 | 140,816 | 179.1 | — |
| Slovakia | 550 | 533 | (3) 539 | 103 1 | 102 1 | 6,955 | 6,740 | (3) 8,572 | 11,591 | 11,233 | (3)14 287 | 103.2 | 81 1 |
| Sweden. | 707 | 763 | 741 | 92 6 | 95.4 | 7 496 | 9,522 | 15,811 | 12,493 | 15,869 | 26,351 | 78.7 | 47.4 |
| Canada. | 22,372 | 28,726 | 25,596 | 77.9 | 87.4 | 181,576 | 330,834 | 187,440 | 302,626 | 551,390 | 312,399 | 54.9 | 96 9 |
| Un St. (w) | 40,316 | 36,147 | 41,186 | 111.5 | 97.9 | 410,980 | 353 491 | 351,467 | 684,966 | 589,151 | 585,778 | 116 3 | 116 9 |
| Un St. (s) | 16,467 | 17 356 | 16 387 | 94.9 | 100 5 | 165 737 | 136,528 | 105 964 | 276,228 | 227,547 | 176,606 | 121.4 | 156.4 |
| Mexico | 1,347 | 1,450 | 1,251 | 92 9 | 107 6 | 8 257 | 8,002 | 7,391 | 13 828 | 13,337 | 12,318 | 103 7 | 112.3 |
| India (4) | 34,499 | 34,003 | 34,485 | — | — | 224,400 | 241,562 | 222,396 | 374,000 | 402 603 | 370,660 | 92 9 | 100 9 |
| Japan. | 1,983 | 2,024 | 1,738 | 96 1 | 114 1 | 32,377 | 39,682 | 30,078 | 53 960 | 66 135 | 50,130 | 81.6 | 107.6 |
| Syria and Leb | 1 600 | ... | 1,363 | ... | 117 4 | 16,560 | 14,760 | 11,692 | 27,600 | 24,600 | 19 486 | 112 2 | 141.6 |
| Algeria | ... | | 4 176 | . | | 19,200 | 16 560 | 20,890 | 32 000 | 27 600 | 34,816 | 115 9 | 91 9 |
| Egypt | 1,561 | 1 563 | 1 464 | 99 9 | 106 7 | 24 918 | 29 997 | 27,510 | 41 529 | 49 994 | 45,848 | 83 1 | 90.6 |
| Tunisia | 1 322 | 1,359 | 1,884 | 97.3 | 70.2 | 8,819 | 6,393 | 9,019 | 14.697 | 10,655 | 15,031 | 137 9 | 97 8 |
| Argentina. | (5)18,039 | (5)17,569 | (5)18,577 | 102.7 | 97 1 | 132 278 | 162,706 | 131,710 | 220,459 | 271,171 | 219,512 | 81 3 | 100 4 |
| Chile | 1,660 | 1,920 | 1,963 | 86 0 | 84 6 | ... | | 18,937 | ... | | 31,562 | ... | . . |
| Uruguay. | 1,043 | 924 | 1,228 | 112 8 | 84 9 | . . | 4,235 | 7,954 | ... | 7,058 | 13,256 | ... | .. |
| New Zealand | 300 | 240 | 221 | 125 0 | 135 5 | 6 000 | 5 040 | 4,277 | 10,000 | 8,400 | 7,129 | 119 0 | 140 3 |
| **RYE** | | | | | | | | | | | | | |
| Belgium. | 310 | 280 | 369 | 110.7 | 84 1 | .. | ... | 7,790 | ... | ... | 13,910 | . . | ... |
| Denmark. | 474 | 339 | 352 | 139.6 | 134.7 | ... | 5,908 | 5 552 | ... | 10,551 | 9 915 | ... | .. |
| Spain | 1,473 | 1,361 | (1)1,302 | 108.2 | 113.1 | 8,754 | 7 740 | (1) 9,041 | 15,632 | 13,821 | (1)16,144 | 113.1 | 96.8 |
| Finland. | 473 | 459 | 578 | 103.0 | 81 7 | 5 997 | 4,627 | 7,774 | 10 708 | 8,263 | 13,883 | 129.6 | 77 1 |
| Netherlands | 596 | 563 | 559 | 105 7 | 106,6 | ... | ... | 11,386 | .. | .. | 20,332 | ... | . . |
| Slovakia. | 372 | 368 | (3) 380 | 101 1 | 97 8 | 4 409 | 4,403 | (3) 5,259 | 7,874 | 7,862 | (3) 9,391 | 100.2 | 83.8 |
| Sweden. | 509 | 422 | 495 | 120 5 | 102 8 | 6,195 | 6,275 | 8,304 | 11 063 | 11,205 | 14,828 | 98.7 | 74.6 |
| Canada. | 1,077 | 1,035 | 816 | 104,1 | 131.9 | 7 785 | 7 837 | 5,147 | 13,902 | 13,994 | 9,191 | 99.3 | 151.3 |
| United States | 3,436 | 3,192 | 3,723 | 107.6 | 92 3 | 26,019 | 22,737 | 25,576 | 46 462 | 40,601 | 45,672 | 114.4 | 101.7 |
| Argentina. | (6)2,661 | (6)2,751 | (6)2,480 | 96 8 | 107,3 | 4 189 | 4,678 | 5,586 | 7,480 | 8,354 | 9,974 | 89 5 | 75.0 |
| Chile | 19 | 24 | 30 | 81 7 | 64 4 | ... | | 173 | ... | . . | 309 | ... | ... |
| **BARLEY** | | | | | | | | | | | | | |
| Belgium. | 74 | 57 | 76 | 130.4 | 98.0 | ... | ... | 1,757 | ... | ... | 3,661 | ... | ... |
| Denmark. | 930 | 956 | 939 | 97.2 | 99 0 | ... | 25,104 | 25,191 | ... | 52,301 | 52,483 | ... | ... |
| Spain. | 3,886 | 3,859 | (1)3 382 | 100 7 | 114.9 | 37,146 | 30,769 | 31,262 | 77,390 | 64,103 | 65,130 | 120,7 | 118.8 |
| Finland | 325 | 281 | 305 | 115.4 | 106.4 | 3,219 | 3,061 | 4,070 | 6,706 | 6,377 | 8,478 | 105,2 | 79 1 |
| Ireland. | 169 | 132 | 118 | 128.0 | 143.2 | ... | 3,114 | 2,598 | ... | 6,487 | 5,413 | ... | ... |
| Slovakia. | 489 | 497 | (3) 492 | 98.5 | 99.5 | 5,842 | 6,719 | (3) 6,946 | 12,172 | 13,999 | (3) 14,470 | 86,9 | 84.1 |
| Sweden. | 240 | 264 | 252 | 90,8 | 95,1 | 3,461 | 4,173 | 4,777 | 7,211 | 8,694 | 9,952 | 82.9 | 72 5 |
| Canada. | 5.449 | 4,341 | 4,291 | 125.5 | 127.0 | 58,261 | 50,043 | 42,663 | 121,378 | 104,256 | 88 882 | 116.4 | 136.6 |
| United States | 13,977 | 13,394 | 10,774 | 104.4 | 129.7 | 168,731 | 148,433 | 113,409 | 351,522 | 309,235 | 236,270 | 113.7 | 148.8 |
| Japan | ... | 1,848 | 1,892 | ... | ... | 36,385 | 37,198 | 35,112 | 75,803 | 77,498 | 73,152 | 97.8 | 103.6 |
| Algeria. | ... | ... | 3,058 | ... | . . | 15,360 | 7,920 | 15,415 | 32,000 | 16,500 | 32,114 | 193.9 | 99.6 |
| Egypt. | 255 | 268 | 278 | 95.1 | 95.1 | 4,699 | 5,315 | 7,339 | 9,789 | 11,073 | 15,290 | 88.4 | 64.0 |
| Tunisia. | ... | ... | 1,174 | ... | ... | 4,400 | 2,000 | 4,564 | 9,186 | 4,134 | 9,508 | 222.2 | 96.6 |

*Area and Production of Cereals*

| COUNTRIES | AREA 1941 | 1941 | Aver 1935 to 1939 | % 1941 1940 = 100 | Aver. = 100 | PRODUCTION 1941 | 1940 | Aver 1935 to 1939 | 1941 | 1940 | Aver 1935 to 1939 | = 1941 1940 = 100 | Aver. = 100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 000 acres | | | | | 000 acres | | | 000 bushels | | | | |
| Argentina | (5)1,972 | (5)2,139 | (5)1,901 | 92 2 | 103.7 | 9,480 | 17,395 | 11,329 | 19,750 | 36,239 | 23,602 | 54.5 | 83.7 |
| Chile | 128 | 128 | 184 | 99.9 | 69 5 | ... | .. | 2,419 | ... | ... | 5,041 | ... | ... |
| Uruguay . | 67 | 54 (6) | 36 | 122.7 | — | ... | 216 (6) | 259 | .. | 450 (6) | 539 | ... | ... |
| New Zealand | 30 | 26 | 24 | 115.4 | 125.5 | 550 | 481 | 461 | 1,146 | 1,002 | 961 | 114.4 | 119.2 |
| OATS | | | | | | | | | | | | | |
| Belgium | 413 | ... | 548 | ... | 75.4 | ... | ... | 14,074 | ... | . . | 43,982 | . . | ... |
| Denmark . . | 846 | 843 | 926 | 100 3 | 91.4 | ... | 19,641 | 22,303 | ... | 61,378 | 69,697 | ... | .. |
| Spain . . | 1,646 | 1,597 | (1)1,423 | 103 1 | 115.7 | 12,469 | 10,459 | (1)10,549 | 38,964 | 32,685 | (1)32,966 | 119 2 | 118 2 |
| Finland | 1,052 | 1,054 | 1,142 | 99.8 | 92.1 | 12,103 | 11,128 | 15,974 | 37,823 | 34,776 | 49,917 | 108,8 | 75.8 |
| Ireland | 779 | 681 | 571 | 114.4 | 136 5 | ... | 16,222 | 12,565 | ... | 50,694 | 39,265 | ... | .. |
| Slovakia | 370 | 365 (3) | 333 | 101 5 | 131 3 | . | 4,596 | (3) 3,660 | ... | 14,363 | (3) 11,437 | ... | .. |
| Sweden . | 1,549 | 1,569 | 1,641 | 98 7 | 94 4 | 17,106 | 20,660 | 27,904 | 53,455 | 64,563 | 87 199 | 82.8 | 61.3 |
| Canada . | 13,841 | 12,298 | 13,246 | 112 6 | 104.5 | 121 705 | 129,379 | 114,944 | 380,327 | 404,309 | 359,201 | 94 1 | 105 9 |
| United States | 37,236 | 34,847 | 35,417 | 106.9 | 105.1 | 364,430 | 395,401 | 329,369 | 1,138,843 | 1,235,628 | 1,029,279 | 92.2 | 110.6 |
| Algeria . | ... | ... | 470 | ... | ... | 2,560 | ... | 3,387 | 8,000 | ... | 10 585 | ... | 75.6 |
| Argentina | (5)3,519 | (5)3,899 | (5)3,547 | 90.2 | 99.2 | 11,464 | 11,894 | 16,254 | 35,825 | 37,168 | 50,795 | 96.4 | 70.5 |
| Chile | 168 | 198 | 279 | 85 3 | 60 3 | ... | | 2,455 | ... | ... | 7,670 | ... | ... |
| Uruguay . | 237 | 225 | 213 | 105,5 | 111.2 | ... | 421 | 992 | ... | 1,316 | 3,100 | ... | ... |
| New Zealand | 60 | 61 | 63 | 98.4 | 95 4 | 1,080 | 1,120 | 1,174 | 3,375 | 3,500 | 3,669 | 96.4 | 92 0 |

(w) Winter crop. — (s) Spring crop — (1) Year 1939. — (2) Not including territories transferred in 1940. — (3) Average of two years — (4) Final estimate except for 1941 area, the figure of which is that of the fourth estimate — (5) Area sown — (6) Not including barley for brewery.

*Greece:* According to information from the Ministry of Agriculture, rains which fell at the beginning of the last decade in November were very favourable to plowing and sowing of cereals Owing however to the scarcity of seeds and agricultural machinery, a decrease of area destined to cereals is forecast

*Romania:* Sowings were continued, with interruptions, until almost the end of November; but, owing to frequent rains in the Fall and to early frosts, the plan of sowings of winter cereals has been realised only in part. The Government has taken timely measures to economies cereal stocks of the 1941 crop and to insure the necessary quantity of spring wheat and barley seeds in order to complete in the Spring sowings that could not be done in the autumn. Romania raises comparatively little Spring wheat. Therefore the whole of available wheat of this variety has been blocked The same has been done with barley, which in Romania is cultivated chiefly in the Spring. In order to save stocks of bread cereals, beginning December 10, bread will be made with whole flour bolted 90 per cent. Wheat flour may also be mixed with rye flour and potatoes. The proportion of potatoes may vary between 10 and 20 per cent.

*Slovakia:* At the end of November, the area sown to winter wheat was normal. In some zones it was above normal.

*Argentina:* Generally speaking, November rains were favourable to cereal crops. According to the first official estimate published on 12 December, wheat production in 1941-42 amounts to 132,277,800 centals (220,458,600 bushels), which was the average production in the five years 1935-36/1939-40 (131,710,000 centals 219,512,000 bushels). As compared with the great crop of 1940-41 however (162,706,000 centals 271,171,000 bushels) it is 18 7 per cent below in spite of the fact that the area sown to wheat this year was 2 7 per cent more than in 1940-41 Compared with the average, on the contrary, sown area was smaller by 3 per cent

*Mexico:* According to press information, the 1940-41 wheat production is estimated at 9,700,000 centals (16,170,000 bushels).

## CURRENT INFORMATION ON MAIZE.

*Romania:* The general agricultural plan in Romania foresees a gradual reduction of area sown to maize, especially in the regions where this crop ordinarily does not reach a complete ripening stage. It is probable however that in the Spring 1942 area sown to maize may be increased, because in the Autumn it was impossible to sow to winter cereals all the land foreseen in the plan of sowings.

*Canada:* According to the first official estimate area cultivated to corn for husking is 300,000 acres, against 186,000 in 1940 and 172,200 on the average of the preceding 5-year period, percentages 161 3 and 174 2. The corresponding production is estimated at about 6,667,000 centals (11,906,000 bushels) against 3,805,000 (6,050,000) and 3,926 000 (7,010,000); percentages 171 2 and 169 8

Formerly the Province of Ontario produced all the corn for husking included in Canadian statistics. This season, however, 1,490,000 centals (2,660,000 bushels) were reported for Manitoba, harvested from 95,000 acres

## CURRENT INFORMATION ON RICE.

*Mexico:* According to press reports, rice production in 1941 has been exceptionally good.

*Peru:* Rice production in 1941-42 is estimated at nearly 1 800.000 centals (3.000 000 bushels) against 1.400.000 centals (3,040.000 bushels) in 1940-41. This abundant production was due to the increase of area sown to rice and to favourable weather conditions, and it is enough to fill the needs of the country.

*Chosen:* The production of rice in 1941-42 is estimated at 100,247,000 centals (222,766,000 bushels) against 87,972,000 (195,489,000) in 1940-41 and an average of 84,251,000 (187,220,000) in 1935-36 to 1939-40; percentages, 114.0 and 119.0.

*Taiwan:* The production of rice in 1941-42 is estimated at 38,053,000 centals (84,560,000 bushels) against 32,324,000 (71,831,000) in 1940-41 and an average of 38,366,000 (85,256,000) in 1935-36 to 1939-40; percentage, 117.7 and 99.2.

*Japan:* The production of rice in 1941-42 is estimated at 227,090,000 centals (504,634,000 bushels) against 249,185,000 (553,733,000) in 1940-41 and an average of 260,140,000 (578,077,000) in 1935-36 to 1939-40; percentages, 91.1 and 87.3.

## CURRENT INFORMATION ON POTATOES.

*Protectorate of Bohemia and Moravia:* In 1941 the production of potatoes was normal.

*Croatia:* According to unofficial information, the potato crop this year is so good that the needs of the population for this product will be abundantly filled In spite of this, the prices of potatoes destined to human consumption and animal feeding and industrial use have increased.

*Spain:* It is confirmed that the potato crop is quite abundant.

*Romania:* In 1942 it may be expected that area sown to potatoes will be considerably increased. In fact some of the area which in the Fall was not sown to cereals will be sown to potatoes. In order to improve the product, seeds of a better quality will be imported from Germany.

*Canada* The first official estimate of the 1941 potato crop has been placed at 39,200,000 centals (65,483,000 bushels), compared with 42,300,000 centals (70,500,000 bushels) the final estimate for the 1940 production, and 38,632,000 (64,386,000) on the average of the five years ending 1939, percentages 92 9 and 101 7 The principal declines in production are reported for Quebec, Prince Edward Island and New Brunswick Increased yields in Manitoba and Ontario are largely responsible for the heavier production in these Provinces

Yield per acre is estimated at about 77 centals (128 bushels) per acre, or slightly under that for 1940 Substantial reductions are reported for most Provinces, with the exception of the sharp increases estimated in both Manitoba and Quebec Total acreage is estimated at 508,100 acres compared with 545 000 in 1940, and 516,000 on the average of the preceding 5 year period, percentages 93 2 and 98 5 This figure, however, is nearly 20,000 acres below the estimate of farmers' intentions to plant, which was issued in the spring on conditions as of April 30

## THE SUGAR SEASON

Since the publication last month of the Crop Report, it results from the latest information received by the Institute, and according to the new figures of the International Association for Sugar Statistics, that beet-sugar production in Europe during the present season has increased over the estimates issued in November for the following countries: Danemark, Romania, Slovakia, Sweden, and Switzerland.

On the contrary, the estimates for Belgium and Latvia have diminished. In the Table containing the data on raw beet-sugar production the estimate for Spain has been added. This estimate indicates an increase of 15 per cent. consequent quite exclusively to the expansion of acreage, in comparison with the production of the sugar season 1940-41. The same estimate is 25 per cent. above the average production of the preceding 5-year period. However, it must be emphasized that this period includes the very poor productions of the civil war years 1938-39 and 1939-40, which reduces the amount of the average in question very substantially below what may be called a normal average.

*Production of Beet-Sugar (raw).*

| COUNTRIES | Total production during the season: 1941-42 (1) | 1940-41 | Average 1935-36 to 1939-40 | 1941-42 (1) | 1940-41 | Average 1935-36 to 1939-40 | % 1941-42: 1940-41 = 100 | Average = 100 |
|---|---|---|---|---|---|---|---|---|
| | thousand centals | | | short tons | | | | |
| Belgium | (2) 5,266 | 5,633 | 5,154 | (2) 263,270 | 281,600 | 257,721 | 93 | 102 |
| Bulgaria | (3) 1,235 | (3) 1,052 | 476 | (3) 62,000 | (3) 52,579 | 23,798 | 117 | 259 |
| Croatia | (3) 419 | (3) 383 | — | (3) 21,000 | (3) 19,161 | — | 109 | — |
| Denmark | 6,283 | 5,490 | 4 949 | 314,000 | 274,000 | 247,463 | 114 | 127 |
| Spain | 4,079 | 3,530 | 3,251 | 204,000 | 176,497 | 162,545 | 115 | 125 |
| Finland | 110 | 165 | 257 | 6,000 | 8,233 | 12,836 | 67 | 43 |
| France | (2) 15,310 | (2) 10,377 | 20,513 | (2) 765,486 | (2) 518,857 | 1,025,635 | 148 | 75 |
| Italy | 10,053 | 13,387 | 8,350 | 503,000 | 669,330 | 417,471 | 75 | 120 |
| Latvia | (2) 529 | (2) 1,118 | 979 | (2) 26,000 | (2) 55,913 | 48,970 | 47 | 54 |
| Lithuania | (2) 739 | (2) 729 | 541 | (2) 36,900 | (2) 36,457 | 27,069 | 101 | 136 |
| Romania | (2)(4) 2,954 | 1,881 | 2,798 | (2)(4) 148,000 | 94,031 | 139,891 | — | — |
| Slovakia | (2) 1,488 | (2) 1,407 | (5) 1,190 | (2) 74,400 | (2) 70,333 | (5) 60,000 | 106 | 125 |
| Sweden | 6,834 | 6,855 | 6,805 | 340,000 | 342,770 | 340,241 | 100 | 100 |
| Switzerland | (2) 419 | 408 | 251 | (2) 21,000 | 20,400 | 12,536 | 103 | 167 |
| Serbia | (2) 799 | (6) 2,425 | (6) 1,913 | (2) 39,928 | (6) 120,000 | (6) 95,665 | — | — |
| United States | (3) 30,600 | 37,758 | 30,409 | (3) 1,530,000 | 1,887,903 | 1,520,407 | 81 | 101 |
| Japan | 882 | 643 | 949 | 40,000 | 34,657 | 47,451 | 127 | 93 |
| Turkey | 1,984 | 1,955 | 1,509 | 100,000 | 97,740 | 75,468 | 102 | 131 |

(1) Approximate data. — (2) Data of International Association for Sugar Statistics. — (3) Licht's estimate — (4) Including Northern Bucovina and Bessarabia — (5) Season 1939-40. — (6) Former Yugoslavia.

The total production of beet-sugar forecasted for the European countries included in the Table, and which represent about 50 cer cent. of the total sugar production of Europe not including the U. S. S. R., is consequently 3 per cent. above the production obtained during the season 1940-41, but 2 per cent. below the average sugar production of the 5-year period starting from the season 1935-36 to the season 1939-40.

## CURRENT INFORMATION ON SUGAR.

*Spain:* By the middle of November the harvest of the sugar beet crop had been completed in the southern regions and had started in the central and northern regions. As far as can be judged at present, yields appear generally rather high. Production is estimated at 26.4 million centals (1,130,000 short tons). This figure is by 2.2 million centals (110,000 short tons) above the preceding estimate. Such production however will not be attained unless deliveries of sugar beets to factories are carried on in the foreseen measure. During harvest in the south, it was noticed that production was not delivered entirely, according to the decrees of the Government.

Owing to low prices set by the Government on sugar beets and to the scarcity of forages, farmers have sold considerable quantities of the product for cattle feeding at double and even treble the official figure.

Sugar beet production is good.

*Finland* According to press information the 1941 sugar beet production amounted to nearly 880,000 centals (44,000 short tons), of which from 88,000 centals (4,400 short tons) to 110,000 centals (55,000 short tons) could not be harvested on account of early frosts

*France* According to press information, the production of sugar is not sufficient to fill the needs of the country notwithstanding the increase of area sown to sugar beet By a law of August 16, 1940, the Government had decided to produce sugar from grapes To this effect factories were immediately built especially in the south By

## *Production of Cane-Sugar.*

| COUNTRIES | 1940-41 (1) | 1939-40 | Average of 1934-35 to 1938-39 | 1940-41 (1) | 1939-40 | Average of 1934-35 to 1938-39 | % 1940-41: 1939-40 = 100 | % 1940-41: Average = 100 |
|---|---|---|---|---|---|---|---|---|
| | 000 centals | | | short tons | | | | |
| **AMERICA** | | | | | | | | |
| Antigua | 540 | 309 | 520 | 27 000 | 15,000 | 25,984 | 175 | 104 |
| Argentina | 11 845 | 11 469 | 8,804 | 592,218 | 573,455 | 440,171 | 103 | 135 |
| Barbados | 1,698 | 1 587 | 2,718 | 85,000 | 79,000 | 135,905 | 107 | 62 |
| Brazil | 28,338 | 26,277 | 23,231 | 1,416 900 | 1,313,800 | 1,161,530 | 108 | 122 |
| Cuba | (2) 54 678 | 63 163 | 60,266 | (2) 2,733,880 | 3,158,000 | 3,013,269 | 87 | 91 |
| United States (La & T.H.) | 6 729 | 10,392 | 8,528 | 336,453 | 519,597 | 426 400 | 65 | 79 |
| British Guiana | 4 255 | 3 748 | 4 233 | 213 000 | 190,000 | 211,669 | 114 | 101 |
| Jamaica | 3 492 | 2,227 | 2,289 | 174,600 | 111,000 | 114,455 | 157 | 153 |
| Martinique | 1,213 | 1,323 | 1,167 | 61 000 | 70 000 | 58,359 | 92 | 104 |
| Mexico | 7 275 | 6 834 | 6,763 | 360 000 | 340,000 | 338,128 | 106 | 108 |
| Peru | 8 929 | 8 897 | 8,426 | 446 000 | 444,829 | 421,291 | 100 | 106 |
| Puerto Rico | 18 629 | 20 375 | 17 748 | 931 000 | 1,018 700 | 887 390 | 91 | 105 |
| Dominican Republic | 8,818 | 10 027 | 9,339 | 440,870 | 501,366 | 466 926 | 88 | 94 |
| St Kitts | 851 | 692 | 700 | 42,500 | 34,600 | 34,977 | 123 | 122 |
| Trinidad | 2,734 | 2,065 | 3,086 | 137 000 | 103 250 | 154 308 | 132 | 89 |
| Venezuela | 611 | 542 | 514 | 30,500 | 27,100 | 25 706 | 113 | 119 |
| *Total America* | *160,635* | *169,927* | *158,332* | *8,027 921* | *8,499 697* | *7,916,468* | *95* | *101* |
| **ASIA** | | | | | | | | |
| Taiwan | 17 593 | 26 630 | 23 776 | 880,000 | 1,331,500 | 1 188,782 | 66 | 74 |
| India | 77 698 | 74 120 | 72,761 | 3 884 800 | 3 706 000 | 3 638,000 | 105 | 107 |
| Japan | 2,205 | 3,386 | 2,751 | 100 000 | 169,300 | 137 560 | 65 | 80 |
| Java | 38 757 | 35 869 | 23,832 | 1 938 000 | 1 793 000 | 1 191 582 | 108 | 163 |
| Philippines | (2) 21,839 | (2) 21 065 | 21,141 | (2) 1,091 900 | (2) 1,053,200 | 1,057 042 | 104 | 103 |
| *Total Asia* | *158 092* | *161,070* | *144,261* | *7 894,700* | *8 053,000* | *7 212 966* | *98* | *110* |
| **AFRICA** | | | | | | | | |
| Egypt | 3 836 | 3,524 | 3,213 | 192 000 | 176,198 | 160,668 | 109 | 119 |
| Mauritius | 6,972 | 5 059 | 6 150 | 348,600 | 252 930 | 307 505 | 138 | 113 |
| Reunion | 2,441 | 1,622 | 1,782 | 122 000 | 81,100 | 89,098 | 150 | 137 |
| Union of South Africa | 11,463 | 11 839 | 10,010 | 570,000 | 592,000 | 500.515 | 97 | 115 |
| *Total Africa* | *24,712* | *22,044* | *21,155* | *1,232,600* | *1,102,228* | *1,057,786* | *112* | *117* |
| **OCEANIA.** | | | | | | | | |
| Australia | 18,010 | 20,787 | 16,607 | 900,500 | 1,039,400 | 830,341 | 87 | 108 |
| Hawaii | 19,379 | 19,028 | 19,112 | 969,000 | 951 400 | 955,596 | 102 | 101 |
| Fiji Islands | 2,654 | 2,557 | 2,973 | 132,677 | 128,000 | 148,630 | 104 | 89 |
| *Total Oceania* | *40,043* | *42,372* | *38,692* | *2,002,177* | *2,118,800* | *1,934 567* | *94* | *103* |
| **TOTALS** | **383,482** | **395,413** | **362,440** | **19,157,398** | **19,773,725** | **18,121,787** | **97** | **106** |

(1) Approximate data. — (2) Willet & Gray estimate

another law, dated August 23, 1940 vine growers were obliged to reserve 20 per cent. of their crop of grapes for sugar production. By these means it might be possible to produce nearly 1,320,000 centals (66,000 short tons) of sugar from grapes. Evidently this law applies only to regions where wine for consumption is produced, because the use of grapes of a superior quality would not be at all rational from the point of view of economy.

*Italy:* According to the Bulletin of the National Consortium of Sugar Manufacturers, the three sugar factories at Foligno, Arezzo and Avezzano were still working at the end of October. By the same date, the factories participating in the Consortium had worked a total of 79,658,485 centals (3,982,870 short tons) of sugar beets, of which 65,654,805 centals (3,282,696 short tons) for the production of sugar and 14,003,680 centals (700,174 short tons) for alcohol distillery. Taking into account the quantity of sugar beets received by factories that do not participate in the Consortium, amounting to nearly 4 million centals (220,000 short tons) and the quantities of sugar beets which probably will still be delivered to factories in activity, a grand total is obtained of 85,098,718 centals (4,254,878 short tons). It is estimated that the quantities of sugar beets destined to cattle feeding amount to 4.7 million centals (220 330,000 short tons). The highest productions of saccharose were obtained in the province of Ferrara with 42.8 centals per acre (2.1 short tons per acre). Rovigo follows with 42.3 centals per acre (2.1 short tons), Piacenza with 42.0 centals (2.1 short tons), Bologna with 41.9 centals (2.1 short tons), Ravenna with 41.0 centals (2.0 short tons) Forli with 39.5 centals (2.0 short tons), Parma with 37.6 centals (1.9 short tons). The averages in the other provinces of Northern Italy vary between a minimum of 28.1 centals (1.4 short tons) per acre (Modena), and a maximum of 36.3 centals (1.8 short tons) per acre (Mantua). In Central and Southern Italy, the production of sugar beets has been very poor. The only exception has been the province of Rieti where the average saccharose production by acre amounted to nearly 33.9 centals (1.7 short tons). In the province of Florence the production amounted to 22.3 centals (1.1 short tons), 20.5 centals (1.0 short tons) were obtained in the province of Pisa, 13.4 (1.0 short tons) were obtained in the province of Littoria, 8.9 (0.4 short tons) at Naples, 20.5 (1.0 short tons) at Salerno and 11.6 (0.6 short tons) in the province of Catanzaro.

Sugar production is sufficient to satisfy completely the country's need during the present season, so that the carry-over of the 1940-41 season, amounting to about 2,750,000 centals (138,000 short tons) will remain untouched.

*Latvia:* The three sugar Latvian factories which had been damaged by war operations, have been rebuilt and are now working in full.

*Lithuania:* One of the three sugar factories existing in Lithuania which had been damaged by war operation has been restored and is now working regularly.

*Argentina:* Production of sugar cane during the present season has been very abundant.

## CURRENT INFORMATION ON VINES.

*Spain:* Final data on wine production are still lacking. In two of the most important wine producing regions, Mancha and Valencia, good yields were obtained. In the other regions yields were low. On the whole, however, production appears higher than last year.

Wine production forecast in Spain this year is for 320 million Imp. gall. (385 million Am. gall.) against 310 million Imp. gall. (370 million Am. gall.) in 1940. Results are below average.

*Greece:* According to information from Athens, the price of dry raisins from Corinth have doubled, while those of Sultanine have more than doubled.

*Romania:* Wine production this year was scarce. At the beginning of December prices of wine were going up, owing to difficulties of transportation. Sudden cold weather in several regions prevented planting of vines.

*Slovakia:* The production of must is estimated this year at 4.400.000 Imp. gallons (5.283.000 Am. gallons), against 1.664.000 (1.998.000) in 1940 and 5.013.000 (6.020.000) in 1939 The 1940 production is considered the weakest in many years, while production is considered the weakest in many years, while production in 1939 is estimated a good one.

Home wine consumption is estimated at from 1.540.000 Imp. gallons, (1.849.000 American gallons) to 1.760.000 Imp. gall. (2 113 000 Am. gall.).

## CURRENT INFORMATION ON OLIVES.

*Spain:* Owing to drought during last summer and autumn, in the principal zones of production the olive harvest is considerably retarded, and was being done in earnest only by the middle of December A good production is forecast in the provinces of Jaen and Seville In the other provinces, yields are irregular.

On the whole it is expected that the 1941-42 olive production will be rather satisfactory

*Turkey:* According to press information, the production of olive oil in the most important producing zones is estimated this year at from 882,000 centals (11,758,000 Am gall ) to 948 000 centals (12,640,000 Am gall ). As the entire consumption in the country is from 265,000 centals (3,527,000 Am. gall.) to 331,000 centals (4,409,000 Am gall ), there is going to be a big surplus for exportation.

*Algeria.* According to unofficial information, the olive production in 1941-42 is estimated at 55,000 thousand lb. (7,350,000 Am. gallons). This figure is only slightly above average.

*Tunis.* According to presse information the 1941-42 oil production is estimated at nearly 77.000 thousand pounds (10 300.000 American gallons), i. e. below average.

# WORLD STATISTICAL SITUATION OF LINSEED, LINSEED OIL AND OF THEIR MOST IMPORTANT SUBSTITUTES

By Doctor A. DI FULVIO.

## World production of linseed.

The Argentine Government has published the first estimate on linseed production in 1941-42. Thus available official data on this crop in the different countries cover nearly 90 per cent of world linseed production. The Soviet Union, within the 1938 frontiers, is not included in the count. In the October issue of the Monthly Crop Report and Agricultural Statistics it was remarked that gaps this year are many and concern mostly the European countries which, owing to the war, stopped the publication of statistics dealing with their national

economies. For several countries however, although official data on production are lacking, we possess information on weather conditions, vegetative development of the crop and, in some cases, also figures on area under cultivation.

The situation of the crop for single countries was examined in detail in the October bulletin. It must now be remarked that linseed in Europe is cultivated for the production of flax, and seeds, while in Argentina, India, North America, Uruguay etc., this crop is cultivated exclusively for the production of seed.

*World Production of Linseed.*

(1,000 bushels of 56 lb.).

| CONTINENTS | 1941-42 | 1940 41 | Average 1935-36/ 1939-40 | 1939 40 | 1938-39 | 1937 38 | 1936-37 | 1935-36 | Average 1930-31 1934-35 |
|---|---|---|---|---|---|---|---|---|---|
| North and Central America | 39,290 | 34,526 | 12,724 | 22,519 | 9,567 | 8,031 | 7,204 | 16 299 | 13,976 |
| South America | 69,682 | 59,643 | 62,588 | 45,234 | 59,958 | 64,367 | 80,902 | 62,478 | 77,910 |
| Argentina | (66 926) | (57,462) | (58,672) | (39,935) | (55,510) | (60,604) | (77,867) | (59,446) | (74,347) |
| Asia (1) | 18,070 | 19,369 | 17,653 | 18,582 | 19,133 | 17,322 | 16,023 | 17 204 | 15,984 |
| Europe (2) | 3) 7,874 | 8,661 | 9,385 | 9,645 | 8 858 | 9,763 | 10,039 | 8,622 | 5,905 |
| U. S. S. R. | ... | .. | 4) 29,526 | 4) 29,526 | 4) 29 526 | 4) 29 920 | 4) 29,526 | 29 133 | 29,837 |
| Africa | 472 | 472 | 442 | 433 | 382 | 535 | 496 | 366 | 559 |
| Oceania | 39 | 39 | 26 | 31 | 35 | 20 | 12 | 31 | 59 |
| GENERAL TOTALS: | | | | | | | | | |
| EXCLUDING U. S. S. R. | 135,427 | 122,710 | 102,818 | 96,444 | 97,933 | 100,038 | 114,676 | 105,000 | 114,393 |
| INCLUDING U. S. S. R. | ... | | 132,344 | 125,970 | 127,459 | 129,958 | 144,202 | 134,133 | 144,230 |

(1) Excluding U. S. S. R. and China. — (2) Excluding U. S. S. R. — (3) Estimate largely approximate. (4) Unofficial data.

The comparatively small importance of the European continent in the world production of this oleagineous plant is evidenced by the fact that it averages something less than 10 per cent of the world total. Taking into account available elements of orientation and statistical evaluations gathered from the most varied sources, and damages caused to the crop by war operations in Poland and in the Baltic regions (which, outside of the U. S. S. R., are the most important linseed producing centers of the continent), the actual linseed production in Europe, within the frontiers of 1938, may be broadly estimated at nearly 4,409,000 centals (7,874,000 bushels). Thus, in spite of a considerable increase of area sown to linseed, the 1941 probable European production would be more than 15 per cent below average (5,291,000 centals equivalent to 9,385,000 bushels).

The Soviet Union, whose production during these last years averaged about 16,535,000 centals (29,526,000 bushels), normally occupies the second place, after Argentina, among world linseed producing countries. After the year 1939, owing to the occupation of a part of Poland and of the three Baltic countries, which together produce almost 50 per cent at of the average European crop, the place of the U. S. S. R. as a great linseed producing country, became even more prominent. In spite of its great production, the Soviet Union exported normally negligible quantities of linseed, as the home market absorbed nearly the total

of the yearly crop. Information that had reached the Institute up to the month of June, indicated that the 1941 sowing plan set by the Government, though somewhat delayed, had been almost completely filled. No official estimate on production has been published. It seems probable however that war operations, which raged over the most important linseed regions of European Russia, where nearly 4/5 of the "Dolgunetz" and 50 per cent of the "Kudriash" varieties are produced, severely damaged this year crop.

In North America, the 1941 production has been exceptionally abundant in the United States and Canada, amounting to a total of 21,945,000 centals (39,187,000 bushels). This figure is 14 per cent above that, already very high, of 1940 (19,266,000 centals 34,404,000 bushels), and it is three times greater than the average of the five preceding years (7,039,000 centals = 12,570,000 bushels). The excellent results of the present season in the United States are chiefly due to very favourable weather conditions rather than to an increase of area. In Canada also weather conditions were very favourable to this crop; but, among other factors that caused such an abundant production (4,123,000 centals = 7,362,000 bushels) *i. e.* 380 per cent above average, the most important was the increase of area, encouraged by the Government in many ways, so that it was more than three times above average.

In Argentina, which is the most important country in the world in linseed production and trade, weather conditions over the chief linseed regions of the country were generally favourable from germination to harvest time. Drought and frost in the month of October, which did heavy damage to cereals, failed to hinder the vegetation of linseed. November rains practically annulled the

*Area, Production and Yield of Linseed in Argentina.*

| YEARS | AREA | | | PRODUCTION | | | |
|---|---|---|---|---|---|---|---|
| | sown | harvested | % of sown area harvested | total | | per acre harvested | |
| | 1,000 acres | 1,000 acres | % | 1,000 centals | 1,000 bush | centals | bushels |
| 1941-42 | 6,746 | .. | ... | 37,479 | 66,926 | ... | ... |
| 1940-41 | 6,760 | 1) 6,178 | 91.4 | 32,179 | 57,462 | 5.2 | 9.3 |
| *Aver. 1935-36/1939-40.* | *7,290* | *6,062* | *83.2* | *32,856* | *58,672* | *5.4* | *9.7* |
| 1939-40 | 7,600 | 5,602 | 73,7 | 22,364 | 39,935 | 4,0 | 7.1 |
| 1938-39 | 6,608 | 5,787 | 87.6 | 31,085 | 55,510 | 5.4 | 9.6 |
| 1937-38 | 7,023 | 5,691 | 81.0 | 33,938 | 60,604 | 6.0 | 10.6 |
| 1936-37 | 8,646 | 7,626 | 88.2 | 43,605 | 77 867 | 5.7 | 10.2 |
| 1935-36 | 6,573 | 5,604 | 85.3 | 33,290 | 59,446 | 6.0 | 10.7 |
| *Aver. 1930-31/1934-35.* | *7,702* | *6,678* | *86.7* | *41,634* | *74,346* | *6.2* | *11 1* |
| 1934-35 | 8,103 | 7,104 | 87.7 | 44,644 | 79,721 | 6.3 | 11.2 |
| 1933-34 | 6,855 | 4,878 | 71.2 | 35,054 | 62,596 | 7.2 | 12.8 |
| 1932-33 | 7,401 | 6,395 | 86.4 | 34,723 | 62,005 | 5.4 | 9.7 |
| 1931-32 | 8,641 | 8,263 | 95.6 | 49,878 | 89,067 | 6 0 | 10.8 |
| 1930-31 | 7,512 | 6,749 | 89.8 | 43,872 | 78,343 | 6.5 | 11.6 |

(1) Unofficial data.

small damaging local effects of the October drought. The first estimate on the 1941-42 production, published by the Argentine Government on 12 December, shows that it has been quite good and has reached the figure of 37,479,000 centals (66,926,000 bushels). This figure is 16.5 per cent. higher than that of the 1940-41 crop (32,179,000 centals = 57,462,000 bushels) which is very near the average for the five years ending in 1939-40 (32,902,000 centals = 58,672,000 bushels).

The area sown to linseed this year was 6,746,000 acres, corresponding almost exactly to that of 1940-41, but showing a 7.6 per cent. decrease as compared with the average. No figure is yet available regarding area harvested; but it is easy to foresee that the proportional difference between the harvested area and the figure of the area sown, owing to damages caused to the crop by unfavourable factors, will be very small considerably smaller, in any case, than the average difference in the preceding five years (16.8 per cent.).

Data on production in Uruguay are not available so far. The last official reports, in Novembre, showed that the condition of the crop was good. Area sown to linseed has constantly increased until 1939-40. In 1940-41 a considerable decrease was registered, which was accentuated this year. In fact it appears that the decrease in 1941-42 has been over ¼ as compared with last year and 23 per cent. as compared with the average. This situation was due mostly to difficulties created by the state of war to exports of surplus stocks which therefore have accumulated in the country.

Production in India, estimated at 9,632,000 centals (17,200,000 bushels), has been 7.7 per cent. below that of 1940, but it is 0.9 per cent. above the average of the five preceding years (9,546,000 centals = 17,047,000 bushels). The area sown this year is respectively 3 6 and 2.1 per cent. below area in 1940-41, and the average.

According to press information, production in Africa was average in French Morocco and very abundant in Egypt, where area sown to linseed was over three times above average. These two countries furnish altogether more than 90 per cent. of the whole production of the continent, the importance of which, however, is very modest, as it amounts only to 243,000 centals (433,000 bushels) a year.

Altogether, world linseed production in 1941-42 reaches an exceptionnally high figure (75,839,000 centals = 135,427,000 bushels). This figure is over 10 per cent. above that of 1940-41 (68,784,000 centals = 122,710,000 bushels) and nearly ⅓ above the average of the five preceding years. The high production of this year was due chiefly to the excellent crop of North America and to good results that are forecast in Argentina. In Asia and Africa, production was average, and in Europe, owing to damages caused by the war, it has probably remained below average.

### World linseed trade.

*Principal exporting countries.* — World linseed exports normally show well marked yearly variations which are in direct correlation with the variations of Argentine crops and available exportable surpluses in that country. During

the two quinquenniums ending respectively in 1933 and 1938, Argentina averaged nearly 80 per cent. of world exports, with a maximum of 90.3 per cent. in 1932, coinciding with the top production of the year 1931-32. Up to the breaking of the present war, Argentina exported the whole of its surpluses from its yearly crops, no matter what their volume. Exports in 1940 amounting to 16,583,000 centals (29,613,000 bushels), i. e. to less one half of export averages in the five years ending in 1938, were the weakest in 20 years. This was due to trade troubles occasioned by the war and, above all, to the weak surpluses from the very small Argentine crop of 1939-40.

*World Exports of Linseed.*

| YEARS | Argentina | | India | | Uruguay | | Other countries | | Total | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1,000 bushels | % | 1,000 bushels | % | 1,000 bushels | % | 1,000 bushels | % | 1,000 bushels | % |
| 1940 | 29,613 | 71.4 | (1) 7,086 | 17.1 | 3,992 | 9.6 | (1) 787 | (1) 1.9 | 41,478 | 100 |
| 1939 | 46,581 | 74.1 | 10,629 | 16.9 | 4,287 | 6.8 | (1) 1,378 | (1) 2.2 | 62,875 | 100 |
| *Average 1934-1938* | *60,683* | *79.8* | *9,781* | *12.9* | *2,879* | *3.8* | *2,649* | *3.5* | *75,992* | *100* |
| 1938 | 49,805 | 75.9 | 11,472 | 17 5 | 2,846 | 4.3 | 1,504 | 2.3 | 65,627 | 100 |
| 1937 | 70,942 | 83.1 | 8,850 | 10.4 | 2,953 | 3.4 | 2,653 | 3.1 | 85,398 | 100 |
| 1936 | 58,576 | 75 1 | 12,381 | 15 9 | 3,027 | 3 9 | 4,000 | 5 1 | 77,984 | 100 |
| 1935 | 69,986 | 86 7 | 5,173 | 6 4 | 2,779 | 3 4 | 2,803 | 3 5 | 80,741 | 100 |
| 1934 | 54,108 | 77 0 | 11,027 | 15 7 | 2,791 | 4 0 | 2,287 | 3.3 | 70,213 | 100 |
| *Average 1929-1933* | *63,677* | *80.9* | *8,389* | *10 7* | *3,198* | *4.1* | *3,402* | *4.3* | *78,666* | *100* |
| 1933 | 54,813 | 74 7 | 13,897 | 18 9 | 2,382 | 3 3 | 2,299 | 3 1 | 73,391 | 100 |
| 1932 | 79,824 | 90 3 | 3,086 | 3 5 | 3,083 | 3 5 | 2,398 | 2 7 | 88,391 | 100 |
| 1931 | 74,025 | 84 7 | 4,500 | 5 1 | 5,232 | 6 0 | 3,638 | 4.2 | 87,395 | 100 |
| 1930 | 46,045 | 72 3 | 10,456 | 16 4 | 3,114 | 4 9 | 4,102 | 6 4 | 63,717 | 100 |
| 1929 | 63,679 | 79 2 | 10,004 | 12 4 | 2,177 | 2 7 | 4,575 | 5.7 | 80,435 | 100 |
| *Average 1924-1928* | *61,655* | *76 1* | *10,004* | *12.3* | *1,866* | *2.3* | *7,515* | *9.3* | *81,040* | *100* |

(1) Calculated data.

Exports this year, on the contrary, felt heavily the effects of the difficulties of all kinds due to the war on the seas; the fall of exports did not depend at all on the lack of stocks on the Argentine market wich at the beginning of the year had reached an average level. Total exports in the first nine months of the year 1941 amounted to 9,954,000 centals (17,775,000 bushels), a figure which is by 4,409,000 centals (7,874,000 bushels) below the exceptionally low exports during the corresponding period in 1940, and by 60.7 per cent. below average exports during the five year period ending in 1939 (25,331,000 centals = 45,234,000 bushels). It must be noticed, however, that contrary to what happened in 1940, the rythm of quarterly exports in 1941 has been characterised by a steady tendency to increase. This tendency has continued and even slightly increased in October, when exports amounted to 1,733,000 centals (3,094,000 bushels), i. e. more than double than in the same month in 1940

Surplus stock of the new Argentine crop available for exports in the next commercial season which coincides with the solar year, may be estimated at 33,069,000 centals (59,053,000 bushels), after deducting quantities put aside for

*Linseed Production in and Exports from Argentina.*

| YEARS | PRO-DUCTION | EXPORTS | | | | | |
|---|---|---|---|---|---|---|---|
| | | first quarter | second quarter | third quarter | fourth quarter | Total absolute | Total % of production |
| | | (1,000 bushels) | | | | | |
| 1941 | 57,462 | 3,555 | 5.563 | 8,657 | ... | ... | ... |
| 1940 | 39,935 | 16,488 | 7,669 | 1,665 | 3,791 | 29,613 | 74.2 |
| *Average 1935/1939* | *66,629* | *20,974* | *11,858* | *12,400* | *13,946* | *59,178* | *88.8* |
| 1939 | 55,510 | 19,802 | 9,972 | 10,547 | 6,260 | 46,581 | 83.9 |
| 1938 | 60,604 | 15,417 | 9,437 | 9,484 | 15,467 | 49,805 | 82.2 |
| 1937 | 77,867 | 26,928 | 15,307 | 12,527 | 16 180 | 70,942 | 93.1 |
| 1936 | 59,446 | 17,897 | 9,311 | 14,460 | 16,908 | 58,576 | 98 5 |
| 1935 | 79,721 | 24,826 | 15,263 | 14,984 | 14,913 | 69,986 | 87 8 |
| *Average 1930/1934* | *68,403* | *22,123* | *12,317* | *13,707* | *13,617* | *61,764* | *90.3* |
| 1934 | 62,596 | 21,775 | 8,976 | 10,925 | 12,432 | 54,108 | 86.5 |
| 1933 | 62,005 | 20,806 | 12,830 | 10,658 | 10,519 | 54,813 | 88.4 |
| 1932 | 89,067 | 24,046 | 16,106 | 20,779 | 18,893 | 79,824 | 89 6 |
| 1931 | 78,343 | 25,200 | 15,350 | 18,314 | 15,161 | 74,025 | 94.5 |
| 1930 | 50,006 | 18,787 | 8,322 | 7,858 | 11,078 | 46,045 | 92 1 |

sowings and the national industry, amounting to 4,409,000 centals (7,874,000 bushels). To this amount must be added the surplus stocks from the preceding season, which amounted at the end of October to 17 637,000 centals (31,495,000 bushels). Surpluses which Argentina can export in the solar year 1942 will total almost 47,400,000 centals (84,400,000 bushels), if exports during the months of November and December of this year were at the same level as those of the month of October. This amount, which is based on the preliminary estimate on production that has been recently published by the Argentine Government, may be subject to more or less appreciable variations, according to corrections that may be made in the next estimates on the production of the present season.

India, at a great distance from Argentina, occupies second place among linseed exporting countries. Up to the time of the breaking of the war, this country normally exported nearly 60 per cent. of its yearly production, for an average of almost 5,600,000 centals (9,840,000 bushels) i. e., about 13 per cent. of the whole world exportations. Export official figures for the years 1940 and 1941 are not known. For the year 1940, information from commercial sources, put exports at 4,000,000 centals (7,086,000 bushels), corresponding to 38 per cent. of the production of that year, which was (as was said before) quite abundant. It follows from what has been said above, that quite considerable stocks have been added to the good production of the present year, constituting a heavy mass notwithstanding the remarkable development given to the national industry of linseed oil extraction, during these last two years.

Exports from Uruguay in 1940 reached a very high level (2,235,000 centals 3,992,000 bushels). This figure is over 40 per cent. above that of average exports during the five years ending in 1938.

*Area and Production in and Exports from India.*

| YEARS | AREA | PRODUCTION | EXPORTS first quarter | second quarter | third quarter | fourth quarter | Total absolute | Total % of production |
|---|---|---|---|---|---|---|---|---|
| | 1,000 acres | (1,000 bushels) | | | | | | |
| 1941 | 3,583 | 17,200 | ... | ... | ... | ... | ... | ... |
| 1940 | 3,713 | 18,641 | .. | ... | ... | ... | (1) 7,086 | (1) 38.0 |
| *Average 1935-1939* | *3,661* | *17,047* | *1,520* | *2,870* | *3,074* | *2,237* | *9,701* | *56.9* |
| 1939 | 3,869 | 17,680 | 2,716 | 2,728 | 4,102 | 1,083 | 10,629 | 60.1 |
| 1938 | 3,889 | 18,440 | 1,472 | 3,472 | 3,976 | 2,552 | 11,472 | 62.2 |
| 1937 | 3,677 | 16,799 | 1,264 | 2,442 | 3,189 | 1,955 | 8,850 | 51.7 |
| 1936 | 3,457 | 15,519 | 1,764 | 3,913 | 3,598 | 3,106 | 12,381 | 79.8 |
| 1935 | 3,410 | 16,799 | 382 | 1,795 | 504 | 2,492 | 5,173 | 30.8 |
| *Average 1930-1934* | *3,087* | *15,640* | *903* | *2,690* | *2,831* | *2,170* | *8,594* | *54.9* |
| 1934 | 3,262 | 15,043 | 1,378 | 3,606 | 3,138 | 2,405 | 11,027 | 73.3 |
| 1933 | 3,301 | 16 240 | 618 | 1,984 | 5,846 | 5,449 | 13,897 | 85.6 |
| 1932 | 3,062 | 16,637 | 819 | 756 | 696 | 815 | 3,086 | 18.6 |
| 1931 | 3,010 | 15,082 | 508 | 1,693 | 1,083 | 1,216 | 4,500 | 29.4 |
| 1930 | 2,802 | 15,200 | 693 | 5,409 | 3,390 | 964 | 10,456 | 68.8 |

(1) Unofficial data

Uruguay furnished last year 9.6 per cent of the world total, against 6.8 per cent, maximum figure, of the year 1939. Monthly export figures of the year 1941 indicate that there has been a rather considerable decrease as compared with preceding years.

These three countries, Argentina, India and Uruguay during the period 1934-38, filled, as an average, over 96 per cent of world linseed needs. The other countries of less importance that contribute to world export trade are Lithuania, Latvia, Belgium, China and French Morocco. The Soviet Union, in spite of the importance of its production, ordinarily exported only negligible quantities, and sometimes even figured among importing countries.

*Principal importing countries.* — The war on the high seas has cut the European continent out of its customary provisioning centers. The demand from the United Kingdom wich in 1934-38 averaged nearly 5,700,000 centals (10,200,000), has been heavily hit by the exceptional circumstances of this moment. The European import trade in linseed which in the years 1934-1938 amounted as an average to almost 30,400,000 centals (54,300,000) i. e. over 2/3 of world exports, is now of negligible importance. Among extra European importing countries, the most important are the United States whose imports in 1940 amounted to 6,623,000 centals (11,862,000) against 8,975,000 (16,027,000) in 1939 and an average of 10,137,000 (18,102,000) in the years 1934-38. In the case of the United States, imports vary quite considerably from year to year, according to the volume of home production. Available data for the first nine months of 1941 show that imports have increased about 1,200,000 (2,100,000) as compared with the corresponding figures last year: 6,363,000 (11,362,000) against 5,185,000 (9,259,000).

**International trade in linseed, tung and perilla oils.**

*Linseed oil.* — Until the beginning of the present war and for a long series of years, average world exportations of linseed oil maintained a steady level: the averages of the three five-year periods ending respectively in 1928, 1933, and 1938, amounted invariably to around 243 million lb. World trade in this product was fed by three countries: the Netherlands, France and Belgium, which in the years 1934-38 contributed to it respectively 71.5, 7.9 and 4.7, i. e. 84.1 per cent of the total. Normally the European continent absorbed 1/4 of world exportations. Owing chiefly to the war, exports in 1939 were the lowest in the course of the years under examination. According to some information from commercial sources, exports in the year 1940 amounted to about 66 million lb., or hardly 1/4 of world totals.

*World Exports of Linseed Oil.*

| YEARS | Netherlands | | France | | Belgium | | Other countries | | World Exports | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1,000 lb. | % | 1,000 lb | % | 1,000 lb | % | 1,000 lb | % | 1,000 lb | % |
| 1940 | ... | ... | ... | ... | ... | ... | ... | ... | [1]) 66,139 | 100 |
| 1939 | 132,719 | 79.5 | [1]) 4,409 | [1]) 2.7 | 7,716 | 4.6 | [1]) 22,046 | [1]) 13.2 | [1]) 166,890 | 100 |
| *Average 1934-1938* | *179,854* | *71 5* | *19,886* | *7.9* | *11,861* | *4.7* | *39,904* | *15.9* | *251,505* | *100* |
| 1938 | 180,339 | 74.7 | 7,496 | 3 1 | 14,330 | 5.9 | 39,242 | 16.3 | 241,407 | 100 |
| 1937 | 197,535 | 71.3 | 24,471 | 8 8 | 14,771 | 5 3 | 40,345 | 14.6 | 277,122 | 100 |
| 1936 | 159,174 | 68 2 | 27,117 | 11 6 | 9,259 | 4.0 | 37,920 | 16.2 | 233,470 | 100 |
| 1935 | 190,921 | 70 0 | 27,117 | 9.9 | 12,566 | 4.6 | 42,329 | 15.5 | 272,933 | 100 |
| 1934 | 171,300 | 73.6 | 13,228 | 5 7 | 8,378 | 3.6 | 39,683 | 17.1 | 232,589 | 100 |
| *Average 1929-1933* | *147,446* | *62.1* | *9,656* | *4.1* | *27,470* | *11.6* | *52,603* | *22.2* | *237,175* | *100* |
| 1933 | 105,161 | 61.6 | 9,480 | 5.5 | 20,724 | 12.1 | 35,495 | 20.8 | 170,860 | 100 |
| 1932 | 126,105 | 58.5 | 10,362 | 4 8 | 34,833 | 16.2 | 44,093 | 20.5 | 215,393 | 100 |
| 1931 | 161,379 | 64.3 | 10,362 | 4 1 | 22,708 | 9.0 | 56,659 | 22.6 | 251,108 | 100 |
| 1930 | 171,961 | 63.8 | 12,346 | 4 6 | 29,322 | 10.9 | 55,777 | 20.7 | 269,406 | 100 |
| 1929 | 172,623 | 61.8 | 5,732 | 2.1 | 29,763 | 10.7 | 70,989 | 25.4 | 279,107 | 100 |
| *Average 1924-1928* | *152,119* | *61.7* | *4,630* | *1.9* | *21,605* | *8.8* | *68,123* | *27.6* | *246,477* | *100* |

[1]) Calculated data.

*Tung oil.* — This oil, owing to its drying characteristics, is widely used instead of linseed oil. It is produced in China, which is also the only exporting country. The China-Japan war has caused a big slump in its exports. The top figures of 1937 (227 million lb.) coincided also with the volume of average exportations of linseed oil. From that year there has been a steady sharp decrease in its exports, which in 1940 had slumped to 51 million lb., against 176 million lb. in the five years 1934-38. Most of the Tung Oil exports are absorbed by the United States, which, according to official American statistics, in the years 1934-1938 imported an average of 129 million lb. Imports in 1940 amounted to 97 million lb. No data for the year 1941 were available after the month of June. Data up to that time show that there had been a further heavy slump.

*Exports of Tung Oil from China by countries.*

(1,000 lb)

| Countries | 1940 | 1939 | Average 1934-1938 | 1938 | 1937 | 1936 | 1935 | 1934 | Average 1929-1933 | Average 1925-1928 |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | *I. — European countries.* | | | | | | |
| Germany | — | 661 | 6,704 | 3,307 | 9,490 | 9,480 | 6,393 | 4,850 | 3,527 | 6,834 |
| Belgo-Lux Un. | 0 | 0 | 749 | 441 | 661 | 1,102 | 661 | 882 | 441 | 441 |
| Denmark | 0 | 220 | 1,411 | 441 | 1,102 | 1,984 | 1,764 | 1,764 | 1,323 | 441 |
| Spain | — | — | 44 | — | 220 | 0 | — | 0 | 0 | 0 |
| France | 220 | 0 | 6,526 | 2,425 | 8,157 | 8,157 | 6,834 | 7,055 | 3,307 | 2,205 |
| Italy | 220 | 220 | 661 | 220 | 1 102 | 220 | 1,102 | 661 | 661 | 661 |
| Norway | — | 0 | 1,014 | 0 | 1,102 | 1,543 | 1,102 | 1,323 | 661 | 220 |
| Netherlands | — | 220 | 3,439 | 882 | 1,323 | 3,527 | 4,630 | 6,834 | 6,393 | 3,648 |
| United Kingdom | 2,205 | 1,323 | 7,187 | 4,409 | 8,157 | 8,376 | 8,157 | 6,834 | 11,685 | 7,716 |
| Sweden | 0 | 220 | 838 | 220 | 1,102 | 1,323 | 882 | 661 | 441 | 220 |
| *Total of 1st group* | *2,645* | *2,864* | *28,573* | *12,345* | *32,406* | *35,714* | *31,525* | *30,864* | *28,439* | *22,486* |
| | | | | *II — Extra-European countries.* | | | | | | |
| United States | 9,259 | 1,543 | 98,018 | 12,566 | 141,317 | 137,348 | 108,468 | 90,390 | 94,138 | 85,319 |
| Australia | 0 | 0 | 794 | 220 | 1,102 | 1,323 | 882 | 441 | 441 | 220 |
| Japan | 0 | 0 | 1,543 | 220 | 1,543 | 2,205 | 1,764 | 1,984 | 1,543 | 882 |
| Hong Kong | 33,731 | 66,360 | 44,269 | 123,018 | 46,738 | 13,228 | 19,180 | 19,180 | 12,125 | 11,905 |
| *Total of 2nd group* | *42,990* | *67,903* | *144,624* | *136,024* | *190,700* | *154,104* | *130,294* | *111,995* | *108,247* | *98,326* |
| *Other countries* | (1) *5,071* | (2) *3,087* | *2,513* | *5,071* | *3,968* | *1,323* | *1,102* | *1,102* | *661* | *441* |
| **General total** | **50,702** | **73,854** | **175,710** | **153,440** | **227,070** | **191,141** | **162,921** | **143,961** | **137,347** | **121,253** |

(1) Of which 3,968 thousand lb exported to Burma — (2) Of which 2,646 thousand lb exported to French Indochina

*Perilla seed and oil.* — Perilla oil is another competitor of linseed oil. Perilla is grown in Manchukuo, especially in the region north of Mukden. In late years its culture has shown a tendency to decrease. Seed production in

*United States Imports of Linseed, Tung Oil and Perilla Oil.*

| YEARS | Linseed | Tung oil | Perilla oil |
|---|---|---|---|
| | 1,000 bushels | 1,000 lb | 1,000 lb |
| 1941 | (1) 11,362 | (2) 15,873 | (2) 3,968 |
| 1940 | 11,862 | 97,004 | 11,244 |
| 1939 | 16,027 | 78,718 | 51,284 |
| *Average 1934-1938* | *18,102* | *129,456* | *58,158* |
| 1938 | 15,366 | 107,365 | 31,747 |
| 1937 | 28,030 | 174,827 | 43,652 |
| 1936 | 15,366 | 134,923 | 117,948 |
| 1935 | 17,578 | 120,152 | 72,312 |
| 1934 | 14,169 | 110,011 | 25,133 |
| *Average 1929-1933* | *14,625* | *104,059* | *13,448* |
| *Average 1924-1928* | *19,011* | *93,035* | — |

(1) Nine months. — (2) Six months

1940 amounted to bout 3,732,000 bushels, against 14,172,000 in 1935. Oil contents of the seeds vary from 40 to 50 per cent. Nearly the whole production is exported to Japan. The chief importing market were the United States that got it either directly from Manchukuo or from Japan. Imports of Perilla oil to the United States in 1940 amounted to about 11,244,000 lb., against 51,284,000 lb. the year before. This last figure is near the average for the years 1934-38.

*Export from Manchukuo of Perilla Seed and Oil.*

| Years | Seed 1,000 bushels | Oil 1,000 lb |
|---|---|---|
| 1939 | 4,724 | 41,888 |
| *Average 1934-1938* | *5,148* | *31,570* |
| 1938 | 3,842 | 29,322 |
| 1937 | 5,031 | 52,250 |
| 1936 | 9,292 | 43,211 |
| 1935 | 5,031 | 25,794 |
| 1934 | 2,543 | 7,275 |
| *Average 1929-1933* | *1,526* | 1) *7,275* |
| 1933 | 2,094 | 6,834 |
| 1932 | 1,764 | 7,496 |
| 1931 | 1,835 | 7,496 |
| 1930 | 1,244 | — |
| 1929 | 693 | — |
| *Average 1924-1928* | *693* | — |

(1) Average of three years

## Prices of linseed oil.

The prices of linseed oil No 1, in paper pesos, franco waggon on docks at Buenos Aires during the first five months of 1940 were constantly above the mean quotations of 1939. The maximum level was reached in April. No

*Prices of Linseed Oil No. 1 in Buenos Aires.*

(Pesos paper per quintal free waggon on docks)

Monthly average:

| | 1941 | 1940 | 1939 |
|---|---|---|---|
| January | 9 37 | 16.95 | 13.46 |
| February | 9.37 | 16.29 | 13 34 |
| March | 9.37 | 17.54 | 13 91 |
| April | 9.37 | 18.89 | 14.29 |
| May | 9 37 | 16.82 | 14.40 |
| June | 9 37 | n. q. | 15 14 |
| July | 9.77 | n. q | 14.34 |
| August | 9.77 | n. q. | 14.43 |
| September | 9.86 | 10.12 | 18.11 |
| October | 10.48 | 8.84 | 16.50 |
| November | ... | n. q. | 16.30 |
| December | ... | 9.37 | 17.22 |
| *Average* | ... | *14.35* | *15.12* |

quotations were given for the three months June-August. The September average shows a heavy slump as compared with prices in the first five months of the year. The slump continued in October. After a brief stop in the quotations, the Argentine Government, beginning 5 December 1940, fixed the base prices of 9.37 and 9.25 paper pesos for linseed No. 1 and No. 2 respectively, from the crops of the years 1939-40 and 1940-41. These prices, which are over 1/3 below the mean quotations of 1939, held, without any variation, till the month of June 1941. In July there was a small improvement which continued in September and October.

**Conclusions.**

The 1941 linseed production was exceptionally abundant, owing chiefly to the excellent crop obtained in the United States and to favourable forecasts on Argentine yields. Taking into account stocks from the year before, exportable exports from Argentina in 1942 appear extremely difficult, and surpluses are so big that their marketing would have been very difficult even in onrmal times. At present, the world market does not offer the slightest chance for trade. War has practically eliminated demand from the European continent which used to import a very high proportion of world linseed production. Europe may count, perhaps, in the summer of 1942 on more considerable amounts of this product than those which in former years came from Soviet production, provided a reorganisation of the great linseed producing centers under military occupation can be effectuated. In no way, as long as present exceptional conditions last, will Europe be able to provision itself from oversea markets. It is besides very doubtful that the United States, with their exceptionally high production, can keep their imports up to the level of former years, notwithstanding the re-armament policy adopted by that country. This policy implies a large use of linseed oil. The breaking of the war in the Far East has added a further difficulty to possibilities of getting other oils to make up for the lack of linseed oil.

**CURRENT INFORMATION ON FLAX.**

*Canada:* According to official estimates area cultivated to linseed is 958,000 acres, against 397,400 in 1940 and 308,500 on the average of the preceding 5-year period, percentages 241.1 and 310.5. The corresponding production is estimated at about 4,123,000 centals (7,362,000 bushels) against 1,707,000 (3,049,000) and 858,000 (1,533,000); percentages 241.5 and 480.3.

*New Zealand:* The New Zealand Department of Agriculture has been experimenting with linen—flax production for several years. In 1939-40, 400 acres of flax for linen were grown, and in 1940-41, owing to the request made by the United Kingdom, 14,000 acres were planted under Government contract in September and October of 1940. The New Zealand Government expected to obtain 5,000 short tons of flax-fiber for export from this area, with an ultimate goal in 1942-43 of 15,000 short tons.

In September and October of 1941, 25,000 acres were apparently planted, which should yield 10,000 short tons of flax fiber Prices have been agreed upon with the British Ministry of Supply for the next two seasons, 1941-42 and 1942-43

## CURRENT INFORMATION ON COTTON.

*Bulgaria:* The Government has issued a decree in vertue of which cotton seeds are subject to State monopoly through the Direction for the purchase and exports of cereals All merchants, cooperatives and factories for the extraction of vegetal oils, as well as storage plants where cotton seeds are kept, must denounce all the amounts of cotton seeds in their possession to the above mentioned Direction within seven days after the issuing of the decree

*Argentina* According to the final cotton report for the crop of the cotton year 1940-41, production is estimated at 232 164 bales of 478 lb net weight against 362 487 in 1939-40, and 275,349 on the average of the preceding 5-year period, percentages 64 0 and 84 3 Harvested area is estimated at about 737,600 acres, as against 727,800 in 1939-40 and 767,800 on the average of the preceding 5-year period, percentages 101 4 and 96 1 The corresponding figures for the area planted were 831,800 acres, against 902,700 and 936,900, percentages 92 1 and 88 8

*India* According to the second official forecast for the cotton year 1941-42 cotton acreage for all India was estimated at 19,235,000 acres, against a revised second forecast for 1940-41 of 18,653,000 acres, and an average of 20,621,000 acres for the same forecast during the preceding five-year period ending with 1939-40, percentages 103 1 and 93 3 In past 10 years second forecasts have averaged 84 per cent of final, or *Supplementary* as officially called, estimates

*Egypt* According to the second report cotton production in 1941 is estimated at 1,671,200 bales of 478 lb. net weight, compared with 1,647,000, the first estimate issued on October 6, 1941, 1,900,100 produced in 1940, and 1,896,100 on the average of the preceding 5-year period, percentages 88 0 and 88 1 In the following table, the crop is classified according to staple length and varieties, and corresponding comparisons with the preceding five years are included

*Classification of the Egyptian cotton crop by staple length, in bales of 478 lb net weight.*

(000's omitted)

| Varieties | 1941 | | 1940 | | 1939 | | 1938 | | 1937 | | 1936 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Acres | Bales* | Acres | Bales | Acres | Bales | Acres | Bales | Acres | Bales | Acres | Bales |
| 1) Long staple: above 1 3/8" . . | ... | 606 | 781 | 680 | 812 | 668 | 871 | 562 | 836 | 740 | 709 | 592 |
| (*Sakellaridis*) . . . . . . . | ... | ... | (91) | (66) | (72) | (43) | (144) | (61) | (167) | (116) | (168) | (108) |
| (*Giza 7*) . . . . . . . . | ... | (400) | (538) | (476) | (625) | (529) | (595) | (405) | (539) | ... | (423) | ... |
| 2) Long-medium staple above 1 1/4" . . . . . . . . | ... | 28 | 43 | 48 | 68 | 87 | 54 | 46 | 31 | 32 | 36 | 30 |
| 3) Medium staple: above 1 1/8". | ... | 1,006 | 925 | 1,137 | 807 | 1,012 | 927 | 1,084 | 1,186 | 1,469 | 1,036 | 1,223 |
| *Scarto* . . . . . . . . . . . . | — | 31 | — | 35 | — | 34 | — | 36 | — | 40 | — | 42 |
| *Total* . . . | *1,706* | *1,671* | *1,749* | *1,900* | *1,687* | *1,801* | *1,852* | *1,728* | *2,053* | *2,281* | *1,781* | *1,887* |

(*) Second estimate — (1) Maarad, Sakha 4, Sakellaridis, Malaki, Karnak, Giza 7. — (2) Wafeer, Fuâdi, Giza 3, etc — (3) Ashmûni and Zagôra.

## CURRENT INFORMATION ON TOBACCO.

*Bulgaria:* These days a special Committee has been set up at Sophia for the general direction of production, home and foreign trade and prices of tobacco leaves and other tobacco products. The Ministries of Agriculture, Commerce and Finances will be represented in the Committee.

According to the most recent information from the Ministry of Agriculture, the tobacco crop within the old frontiers of the country, is estimated this year slightly lower than last year as a result of damage done by drought. It is foreseen that also in the recently annexed regions, the crop will be lower than last year. In the Aegean Thrace area sown to tobacco this year is 50 per cent. below that of the year before The 1941 production all over the country will be lower than that of 1940. It will however amount to 132 million lb As far as quality is concerned, this year tobacco crop is not worse than that of last year.

*Croatia:* In spite of the reduction of area sown to tobacco in Dalmatia and Herzegovina imposed by the former Yugoslav Government, an abundant tobacco crop is forecast this year The Croatian Government has prepared a plan for the extension of tobacco culture during the coming agricultural year.

## CURRENT INFORMATION ON OTHER PRODUCTS.

### Groundnuts.

*French West Africa:* According to unofficial information from Vichy, all the 1940-1941 groundnut production in Senegal, estimated at 8.8 million centals (not including 2,4 million centals for the needs of the colony) and surpluses of the production of the preceding season, calculated at 3 3 million centals, could be transported to France. Owing to a long period of drought, the new harvest which begins in December, appears rather poor. On the basis of cultivated areas, it is estimated that the new 1941-42 crop will not be above 7.7-8.8 million centals. Of this amount, 2.6 million centals will have to be left in the colony for home consumption.

### Jute.

*India:* According to the final report area cultivated to jute in 1940 was 4,425,000 acres, against 3,119,000 in 1939 and 2,758,000 on the average of the preceding 5-year period; percentages: 141.9 and 160.4 .The corresponding production is estimated at about 50,400,000 centals (12,600,000 bales of 400 lb.) against 38,584,000 (9,646,000) and 32,721,000 (8,180,000); percentages. 130.6 and 154.0.

According to the preliminary official forecast for the 1941 crop, the area cultivated with jute is estimated at 2,212,600 acres, a reduction of some 50 per cent. from the acreage of 1940 crop. Most of this reduction is accounted for by the great decrease of acreage in Bengal, where 80 to 90 per cent. of India's jute is grown. This year's acreage in Bengal is estimated at 1,633,900 acres against the final estimate last season of 3,607,000 acres. Heavy rains and floods influenced the crop, besides war conditions.

In 1940, the growers planted all available land, because war orders had increased consumption beyond the 1939 production, and relatively high prices prevailed at planting time. But the demand gradually diminished, prices were declining, and Bengal was faced with a large carry-over from the record jute crop of 1940.

Legislation had previously been contemplated to restrict jute growing. A regulation for the 1940 crop was passed earlier but was later withdrawn, since it was useless to try to put it into effect under the favourable conditions at the time of planting.

In September, 1940, when prices were lower and a possible carry-over of more than 4,000,000 bales was evident, a law was passed in Bengal limiting the 1941 acreage on the basis of one to three of the 1940 plantings, fixed at 4,938,850 acres under the terms of the Bengal Jute Regulation Act of 1940

Loss of markets in continental Europe, scarcity of shipping facilities for exporting jute, and war activity in the Pacific, have resulted in the heavy accumulation of stocks from last year's bumper crop The inability of other countris to obtain jute, coupled with its high price, has caused these countries to seek substitutes for jute, particularly tropical and sub-tropical American and African countries

### CURRENT INFORMATION ON FODDER CROPS.

*Argentina* In November, the condition of pastures was average

## *LIVESTOCK AND DERIVATIVES*

### PIGS AND POULTRY IN DENMARK *).

(Thousands of head)

| Classification | 1941 nov 15 | 1941 Oct. 4 | 1941 Aug 23 | 1941 July 12 | 1941 May 30 | 1941 April 19 | 1941 March 8 | 1941 Jan 25 | 1940 Dec 13 | 1940 Nov 2 |
|---|---|---|---|---|---|---|---|---|---|---|
| Boars for breeding | 9 | 10 | 11 | 11 | 11 | 11 | 11 | 11 | 11 | 13 |
| Sows in farrow for first time | 28 | 44 | 57 | 78 | 74 | 64 | 45 | 32 | 25 | 22 |
| Other sows in farrow | 68 | 79 | 86 | 85 | 87 | 87 | 93 | 100 | 103 | 108 |
| Sows in milk | 50 | 59 | 61 | 53 | 47 | 51 | 45 | 44 | 49 | 60 |
| Sows not yet covered (and not for slaughter) | 27 | 24 | 22 | 17 | 18 | 15 | 17 | 20 | 23 | 32 |
| Sows for slaughter. | 21 | 18 | 10 | 7 | 8 | 7 | 11 | 14 | 17 | 23 |
| *Total sows* | *194* | *224* | *236* | *240* | *234* | *224* | *211* | *210* | *217* | *245* |
| Sucking pigs not weaned | 398 | 494 | 515 | 440 | 390 | 429 | 364 | 350 | 401 | 515 |
| Young and adult pigs for slaughter | | | | | | | | | | |
| Weaned pigs under 35 kg | 534 | 524 | 462 | 420 | 432 | 409 | 455 | 523 | 607 | 669 |
| Pigs of 35 and under 60 kg. | 416 | 401 | 399 | 405 | 366 | 419 | 473 | 503 | 516 | 600 |
| Fat pigs of 60 kg and over | 374 | 360 | 317 | 254 | 288 | 333 | 359 | 371 | 437 | 486 |
| *Total pigs* | *1 925* | *2,013* | *1,940* | *1,770* | *1,721* | *1,825* | *1,873* | *1,968* | *2,189* | *2,528* |

| | 1941 Nov 15 | 1941 July 12 | 1941 April 19 | 1941 March 8 | 1940 Nov 2 | 1940 June 29 | 1939 July 16 | 1938 July 16 |
|---|---|---|---|---|---|---|---|---|
| *Fowls* | *7.137* | *11.948* | *8.352* | *8.055* | *11.260* | *21 865* | *32.398* | *27.864* |
| Chicken under 6 months | 924 | 5.001 | 347 | — | 1.161 | 9.673 | 18.980 | 15.732 |
| Cocks 6 months old and over | 195 | 97 | 160 | 171 | 233 | 127 | 188 | 174 |
| Hens 6 months old and over | 6.018 | 6.850 | 7,845 | 7.884 | 9.866 | 12.065 | 13.530 | 11.958 |

*) Rural districts.

## LIVESTOCK IN IRELAND.

Estimates of the numbers of livestock in Ireland on June 1, 1941 are reproduced below together with the comparative figures of the numbers on June 1 in each of the preceding four years.

*Livestock in Ireland on June 1.*

| Year | Cattle | Horses | Asses | Mules | Sheep | Goats | Pigs |
|---|---|---|---|---|---|---|---|
| | (Thousand head) | | | | | | |
| 1941 | 4,179 | .. | .. | . | 2 959 | . | 781 |
| 1940 | 4,021 | .. | .. | . | 3,039 | | 1,058 |
| 1939 | 4,057 | 445 | 148 | 10 | 3,048 | 116 | 931 |
| 1938 | 4,056 | 442 | 156 | 10 | 3,197 | 113 | 959 |
| 1937 | 3 955 | 429 | 159 | 11 | 3,000 | 117 | 934 |

## WOOL PRODUCTION IN CANADA.

According to a preliminary estimate, total production of shorn and pulled wool, grease basis, in Canada during 1941 amounts to about 18,000,000 lb , compared with 18,127,000 lb in 1940 and 17,684,000 lb. on the average of the preceding 5-year period; percentages: 99.3 and 101 8. Prior to the present war, home wool production averaged about 30 per cent of the total annual Canadian consumption of wool, on a grease basis. The remaining was imported principally from New Zealand, United Kingdom, and Australia.

## LIVESTOCK IN NEW ZEALAND.

The following are the numbers of livestock in 1941 in New Zealand, with corresponding figures for the previous four years:

*Livestock in New Zealand on January 31.*

| Years | Cattle: Total | Cattle: Cows | Pigs | Horses |
|---|---|---|---|---|
| | (Thousand head) | | | |
| 1941 . . . . . . . . . . . . . . | 4,576 | (1,855) | 767 | .. |
| 1940 . . . . . . . . . . . . . . | 4,533 | (1,850) | 714 | .. |
| 1939 . . . . . . . . . . . . . . | 4,565 | (1,854) | 683 | 275 |
| 1938 . . . . . . . . . . . . . . | 4,506 | (1,873) | 756 | 278 |
| 1937 . . . . . . . . . . . . . . | 4,389 | (1,936) | 802 | 278 |

The return of sheep as at April 30, 1941, gives a total of 31,771,000 an increase of over 700,000 on the number at the same date last year.

*Sheep in New Zealand on April 30.*

| Year | Head |
|---|---|
| 1941 | 31,771,000 |
| 1940 | 31,063,000 |
| 1939 | 31,897,000 |
| 1938 | 32,379,000 |
| 1937 | 31,306,000 |
| 1936 | 30,114,000 |
| 1935 | 29,077,000 |

**CURRENT INFORMATION ON LIVESTOCK AND DERIVATIVES.**

*Croatia:* A Commercial Dairy Association will shortly be founded at Zagreb. All dairies and establishments for the transformation of milk will belong to it. The main purpose of the new Association is going to be the direction and regulation of production, home trade and prices of milk and its derivatives in the country.

*Romania:* Following the cattle improvement plan, Romania has imported from Germany some hundreds of bulls and cows for reproduction. Boars and sows will also be imported shortly, for the reproduction of an improved race.

*Argentina:* Sanitary conditions of cattle in November were good all over the country.

According to information from the Argentine Ministry of Agriculture which appeared in the press, the 1940 production by 1564 dairies amounted to 819,750 centals of butter, 1,169,230 centals of cheese and 479,290 centals of caseine. The corresponding figures for the year 1939 were as follows: butter 755,040 centals, cheese 1,125,790 centals, and caseine 458,140 centals.

# THE WORLD SILK SITUATION

By Doctor M. COSTA

## I. — World cocoon production in 1941.

The following survey on world cocoon production in 1941 made by the International Institute of Agriculture contains all available data for the various countries that are listed according to their importance as silk producers.

Owing to unfavourable weather and to a reduction of mulberry tree culture, the cocoon production in Japan this year was very poor, both as regards spring and summer-autumn breedings. The spring crop was about 20 per cent. and the autumn crop about 30 per cent. below the corresponding crops in 1940. The whole Japanese cocoon production this year is estimated at 551,000,000 lb. against 723,000,000 lb. last year, and an average 690,000,000 during the five

years 1935-39. Information about China is uncomplete and fragmentary. It is known however that these last years the Chinese cocoon production showed a steady tendency to decrease. In fact, from an average 441,000,000 lb. in the years 1924-28, production fell to an average 276,000,000 lb., during the period 1934-38. Production in 1939 and 1940 seems to have been considerably below 220,000,000 lb. Owing to unfavourable weather and to the war between China and Japan, a very poor crop is forecast also for 1941. Most probably it will not be above 176,000,000 lb.

In Italy, according to reports published by the « *Ente Nazionale Serico* », the silk season started late. Bad weather in the first days of May hindered the vegetation of mulberry trees, especially in the northern and central regions. Frequent recurrences of maladies of mulberry trees were reported. During May and until the middle of June the growth of the silk worms was rather irregular. Maladies, and especially muscardine and flaccidity caused serious damage. Deliveries to the centers of collection began towards the middle of June, but the results of these operations ar not yet known. In 1940 the production of cocoons in Italy was nearly 77,000,000 lb. This figure shows that considerable progress was made after several years of very poor productions. The lowest point was registered in 1935 with little more than 37,000,000 lb.

In the Soviet Union, the results of the season are estimated good, especially in Uzbekistan and Turkmenistan, which are the two regions that average a little over one half of the whole production in the U. S S. R. It would seem that the amounts set by the plan for deliveries of cocoons, were reached by nearly all of the silk producing regions of the country. Quality is good At the beginning of the present year the Soviet government approved a plan for a systematic development of silk production. According to this plan, the production of cocoons should be doubled in the course of the next five years. The average production is, at present, nearly 55,000,000 lb., with a remarkable increase over preceding periods. In fact, in the years 1924-28 the cocoon crop in the U. S. S. R. was nearly 22,000,000 lb., which rose to 33,000,000 during the five years 1929-33 and to 44.000 000 in the years 1934-38.

In Turkey, the cocoon production this year is estimated very poor, because unfavourable weather conditions caused damages to breeds, and mulberry trees were not sufficient. Quite probably it remained slightly below 4,000,000 lb. These results marked a stoppage after a series of years of steadily increasing crops. It it estimated that in the period 1924-28 the cocoon production in Turkey was hardly 2,000,000 lb., against 4,500,000 lb. during the five years 1934-38. In Bulgaria, the quantity of incubating eggs and the production of cocoons were considerably lower than in 1940. This decrease was due to damages caused to mulberry trees by cold weather and to a certain lack of labour. The cocoon production has undoubtedly remained below 4,000,000 lb., while it was 5,000,000 lb. in 1940 and 3,500,000 lb. during the five preceding years. In France, silk production in 1941 was somewhat above that of 1940: it is estimated at almost 1,310,000 lb., against 1,280,000 last year. French cocoon production in 1940 and 1941 indicates a certain improvement after the 1939 minimum of 1,200,000 lb. Present results, however, are very poor if com-

pared with those obtained in preceding periods. During the five years 1924-28, for instance, cocoon production in France was 7,500,000 lb.

Early information on silk production in Brazil in the course of the present season that began in September 1941 and will end in May 1942, is good, and it is estimated that the quantity of eggs in incubation is greater than that of the year 1940-41, when cocoon production amounted to nearly 900,000 lb. In Spain, mulberry trees grew wonderfully well, but their vegetation was too quick, so that silkworms, during the first period of growth, were nourished on leaves that had ripened too much. In some places, cold and rainy weather did damage to the breed. The quantity of incubating eggs in 1941 was bigger than in 1940 and the production of cocoons is estimated at 900,000 lb., which is almost average. In Hungary, weather conditions were very favourable, except at the beginning of the season. The month of May was very rainy and mulberry tree leaves were damaged. The yield was nearly 900,000 lb., slightly below average.

The lack of statistical data on cocoon production in some important producing countries makes it impossible to estimate world results of the 1941 silk season. In a merely conjectural way and under all reserves imposed by presen circumstances, it may be said that world cocoon production in 1941 may be estimated at 950,000,000 lb. Thus the 1941-42 raw silk production will be from about 99 to 110 million lb Cocoon production in 1940 amounted to 1,145,000,000 lbs., 1,160,000,000 in 1938 and an average 1,200,000,000 in the period 1934-38.

While world cocoon and silk productions show a tendency to decrease, world production of artificial textile fibers (rayon and staple fibres) show a contrary tendency and are increasing steadily. In 1940 this production reached 2,400,000,000 lb., or 7 per cent above that of 1939, which in its turn, was 15 per cent. greater than in 1938.

Germany has maintained first place among the countries that produce textile from fibers. Her production amounts to about 35 per cent. of the world total, followed by Japan. After Japan, by order of importance, follow the United States, Italy and the United Kingdom.

## II. — Trade, prices and stocks of raw silk in 1940-41.

The lack of detailed statistical data for some countries that are among the most important exporters of raw silk, make it necessary for us to to give this year only the quarterly figures of raw silk imports into the United States for the five years 1936-37 to 1940-41. The predominant importance of that country in this matter is well known: raw silk imports to the United States represent, as an average, 75 per cent. of the total international silk trade. Broadly speaking the trend of trade has been regressive lately, and demand from the United States in 1940-41 has been less than in 1939-40. Monthly imports of raw silk in 1940-41 averaged 3,806,000 lb., against 3,809,500 lb. in 1939-40. Monthly deliveries in 1940-41 averaged 3,720,600 lb., against 3,560,300 in 1939-40. As in 1940-41 deliveries to factories were, on the whole, nearly 1,000,000 lb. below

imports, a further increase of stocks has been registered in the United States during the season. Stocks rose from 5,531,000 lb. at the end of June 1940 to 7,066,900 lb at the end of June 1941

United States. — *Imports, Consumption, Stocks in the United States and Prices in New-York, of Raw Silk by commercial season.*

| SEASON | IMPORTS | | DELIVERIES TO MILLS | | STOCKS AT THE END OF THE PERIOD | | PRICES in New-York Grade XX (78 %) 13/15, Spot | |
|---|---|---|---|---|---|---|---|---|
| | Total (lb.) | Japanese silk % | Total (lb.) | Japanese silk % | Total (lb.) | Japanese silk % | in dollars per lb | in gold francs per kilogr |
| **1936-37.** | | | | | | | | |
| July-September | 15,675,200 | 95 | 16,449,700 | 94 | 3,908,400 | 85 | 1.73 | 11.67 |
| October-December | 18,512,600 | 92 | 16,547,300 | 91 | 5,873,800 | 89 | 1.92 | 13.01 |
| January-March | 15,861,100 | 89 | 16,216,000 | 91 | 5,518,900 | 82 | 2.02 | 15.68 |
| April-June | 15,267,900 | 92 | 14,762,000 | 91 | 6,024,800 | 86 | 1.90 | 12.84 |
| *Total and Average* | *65,316,800* | *92* | *63,975,000* | *92* | — | — | *1.89* | *12.80* |
| **1937-38:** | | | | | | | | |
| July-September | 13,189,200 | 97 | 13,400,600 | 94 | 5,813,300 | 91 | 1.92 | 12.99 |
| October-December | 12,604,900 | 96 | 11,867,200 | 97 | 6,551,000 | 91 | 1.66 | 11.29 |
| January-March | 10,930,500 | 94 | 12,677,400 | 95 | 4,804,100 | 89 | 1.63 | 11.02 |
| April-June | 13,448,600 | 91 | 12,373,300 | 90 | 5,879,400 | 91 | 1.63 | 11.01 |
| *Total and Average* | *50,173,200* | *95* | *50,318,500* | *94* | — | — | *1.71* | *11.56* |
| **1938-39** | | | | | | | | |
| July-September | 14,044,300 | 97 | 14,539,700 | 96 | 5,384,000 | 92 | 1.80 | 12.14 |
| October-December | 16,531,400 | 93 | 14,869,400 | 94 | 7,045,000 | 90 | 1.84 | 12.43 |
| January-March | 10,809,600 | 89 | 14,798,500 | 90 | 3,057,000 | 85 | 2.08 | 14.04 |
| April-June | 10,090,800 | 91 | 10,607,100 | 90 | 2,540,400 | 86 | 2.59 | 17.47 |
| *Total and Average* | *51,476,100* | *93* | *54,815,100* | *93* | — | — | *2.08* | *14.02* |
| **1939-40** | | | | | | | | |
| July-September | 13,840,900 | 88 | 12,710,000 | 89 | 3,671,300 | 84 | 2.79 | 18.83 |
| October-December | 16,276,900 | 82 | 12,593,800 | 85 | 7,354,400 | 77 | 3.57 | 24.09 |
| January-March | 8,457,800 | 78 | 9,743,700 | 82 | 6,068,600 | 72 | 3.19 | 21.53 |
| April-June | 7,138,700 | 73 | 7,676,300 | 74 | 5,531,000 | 72 | 2.70 | 18.22 |
| *Total and Average* | *45,714,300* | *82* | *42,723,800* | *83* | — | — | *3.06* | *20.67* |
| **1940-41:** | | | | | | | | |
| July-September | 11,163,900 | 81 | 11,325,600 | 78 | 5,879,000 | 77 | 2.54 | 17.14 |
| October-December | 16,816,600 | 84 | 13,140,900 | 82 | 9,554,800 | 83 | 2.61 | 17.61 |
| January-March | 7,937,600 | 86 | 10,892,600 | 85 | 6,599,800 | 83 | 2.66 | 17.95 |
| April-June | 9,754,900 | 86 | 9,287,800 | 82 | 7,066,900 | 87 | 2.94 | 19.84 |
| *Total and Average* | *45,673,000* | *84* | *44,646,900* | *82* | — | — | — | — |

The considerable and steady increase of silk prices in Japan during the period under examination, has highly favoured the transfer of raw silk from producers to exporters of Yokohama and Kobe. Consequently arrivals to these two great export centers from the interior of the country, were far greater in 1940-41 than in 1939-40. On the other hand exports in 1940-41 remained below average. In these market conditions, raw silk stocks at Yokohama and Kobe

increased considerably in 1940-41: from 2,120,000 lb. at June 30, 1940, to 17,415,000 at June 30, 1941. In pursuance with the law on silk price stabilisation, purchases by the Japanese Government began in July 1940. Following these purchases, raw silk stocks belonging to the Government, which were inexistent at June 30, 1940, rose to 15,655,000 by June 30, 1941.

The end of the season 1940-41 marks the end of raw silk trade between Japan and the United States as a result of the measures of an economic character taken by the United States against Japan at the end of July. These measures were followed by a declaration of war between the two countries on December 8, 1941

In order to meet this situation which as compared with demand, might cause a heavy surplus of raw silk in Japan, the Japanese Government had some time hence encouraged home consumption, which in fact has comparatively increased lately. It seems now that authorities have decided to reduce the cultivation of mulberry trees and to sow the land to food producing cultures.

The trade in raw silk among the other less important producing and importing countries met with great difficulties in 1940-41. Before the present war, raw silk imports to Europe (including cocoons turned into silk) averaged 15,400,000 lbs, i e., 15 per cent. of the world total. Of these 15,400,000 lbs., 5.5/7 millions went to France, 4/5.5 millions to Great Britain and 2/3.3 to Germany While during the five years 1934-35 to 1938-39 imports to France decreased considerably, those to Great Britain and Germany showed a steady increase. The chief exporters to France and to the United Kingdom were Japan and China Italy and Japan furnished Germany.

Owing to the blockade, France is now unable to get from overseas the silk and dry cocoons needed to feed its industries. Except for small quantities of silk put at the disposal of manufacturers by military authorities, and for some old surpluses, the silk industry of Lyon has been nearly dead these last two years The import trade of raw silk and dry cocoons to France in 1940-41 has also been almost nil. The British market too is probably in a difficult position, because the transportation of silk from the Far East, which was already seriously handicapped, has now become well nigh impossible owing to the spreading of the war

On the contrary, silk imports to Germany in 1940-41 have undoubtedly increased, both on account of growing exchanges with Italy and of the ever increasing use of silk in war industries. Another importing country, Switzerland, during the five years 1935-39 imported an average of 617,300 lb. of silk, against 793,700 lb. in the period 1929-33. Import figures for 1940 are not known; but, owing to present circumstances, it is quite probable that they were lower than in the preceding years.

# TRADE

| COUNTRIES | October | | | | Three months (August 1 October 31) | | | | October | | | | Three months (August 1 October 31) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Exports | | Imports | | Exports | | Imports | | Exports | | Imports | | Exports | | Imports | |
| | 1941 | 1940 | 1941 | 1940 | 1941 | 1940 | 1941 | 1940 | 1941 | 1940 | 1941 | 194 | 1941 | 1940 | 1941 | 1940 |
| **Wheat.** | | | | | | | | | | | | | | | | |
| | Thousand centals (1 cental = 100 lb) | | | | | | | | Thousand bushels of 60 lb | | | | | | | |
| Portugal | 0 | 0 | 39 | 266 | 0 | 0 | 919 | 546 | 0 | 0 | 65 | 443 | 0 | 0 | 1 532 | 910 |
| Romania | 0 | 0 | — | — | 0 | 15 | — | — | 0 | 0 | — | — | 0 | 25 | — | — |
| Sweden | — | — | 0 | 30 | — | — | 0 | 69 | — | — | 0 | 50 | — | — | 1 | 115 |
| Argentina | 3 207 | 3 826 | — | | 11 699 | 14 449 | — | — | 5 345 | 6 376 | — | — | 19 197 | 24 081 | — | — |
| **Wheat Flour.** | | | | | | | | | | | | | | | | |
| | Thousand centals (1 cental = 100 lb) | | | | | | | | Thousand barrels of 196 lb | | | | | | | |
| Portugal | 0 | 0 | 1 | 5 | 0 | 0 | 2 | 5 | 0 | 0 | 0 | 3 | 0 | 0 | 1 | 3 |
| Argentina | 63 | 86 | — | — | 249 | 302 | — | — | 32 | 44 | — | — | 127 | 154 | — | — |
| **Total Wheat and Flour †).** | | | | | | | | | | | | | | | | |
| | Thousand centals (1 cental = 100 lb) | | | | | | | | Thousand bushels of 60 lb | | | | | | | |
| | Net Exports (*) | | Net Imports (**) | | Net Exports (*) | | Net Imports (**) | | Net Exports (*) | | Net Imports (**) | | Net Exports (*) | | Net Imports (**) | |
| Portugal | — | — | 40 | 273 | — | — | 922 | 553 | — | — | 66 | 455 | — | - | 1 537 | 922 |
| Argentina | 3 291 | 3 941 | — | — | 12 031 | 14 852 | — | — | 5 485 | 6 569 | — | — | 20 051 | 27 752 | — | — |
| **Rye.** | | | | | | | | | | | | | | | | |
| | Thousand centals (1 cental = 100 lb) | | | | | | | | Thousand bushels of 56 lb | | | | | | | |
| | Exports | | Imports | | Exports | | Imports | | Exports | | Imports | | Exports | | Imports | |
| Sweden | — | — | 0 | 30 | — | — | 0 | 413 | — | - | 0 | 53 | - | — | 0 | 738 |
| Argentina | 0 | 34 | — | — | 2 | 182 | — | — | 0 | 61 | — | — | 3 | 326 | — | — |
| **Barley.** | | | | | | | | | | | | | | | | |
| | Thousand centals (1 centals = 100 lb) | | | | | | | | Thousand bushels of 48 lb | | | | | | | |
| Romania | 11 | 0 | — | — | 44 | 0 | - | — | 23 | 0 | - | — | 92 | 0 | — | — |
| Argentina | 165 | 153 | — | — | 523 | 621 | — | — | 343 | 320 | — | — | 1 089 | 1 295 | — | — |
| **Oats.** | | | | | | | | | | | | | | | | |
| | Thousand centals (1 cental = 100 lb) | | | | | | | | Thousand bushels of 32 lb | | | | | | | |
| Sweden | — | – | 15 | 173 | — | — | 48 | 187 | — | — | 48 | 540 | — | – | 150 | 583 |
| Argentina | 217 | 20 | | | 664 | 100 | | | 679 | 61 | | | 2 074 | 312 | | |
| **Maize.** | | | | | | | | | | | | | | | | |
| | Thousand centals (1 cental = 100 lb) | | | | Twelve Months (November 1 October 31) | | | | Thousand bushels of 56 lb | | | | Twelve Months (November 1 October 31) | | | |
| | | | | | 1940 41 | 1939 40 | 1940 41 | 1939 40 | | | | | 1940 41 | 1939 40 | 1940 41 | 1939 40 |
| Portugal | 0 | 0 | 93 | 75 | 7 | 0 | 1 760 | 349 | 0 | 0 | 165 | 134 | 13 | 0 | 3 143 | 623 |
| Romania | 2 | 164 | — | — | 3 305 | 13 624 | — | — | 4 | 293 | — | — | 5 902 | 24 329 | — | — |
| Domenican R | | | — | — | ²) 168 | ²) 102 | — | — | | | — | — | ²) 301 | ²) 183 | — | — |
| Argentina | 1 721 | 1 811 | — | — | 12 998 | 46 181 | — | — | 3 073 | 3 233 | — | — | 23 211 | 82 467 | — | — |
| Peru | | | | | ¹) 0 | ¹) 0 | ¹) 0 | ¹) 1 | | | | | ¹) 0 | ¹) 0 | ¹) 1 | ¹) 2 |

(*) Excess of exports over imports — (**) Excess of imports over exports

(†) Flour reduced to grain on the basis of the coefficient 1,000 centals of flour = 1,333 333 centals of grain (Thousand barrels of flour = 4,355 55 bushels of grain)

¹) Up to July 31 — ²) Up to March 31

| COUNTRIES | October | | | | Ten Months (January 1-October 31) | | | | October | | | | Ten Months (January 1-October 31) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Exports | | Imports | | Exports | | Imports | | Exports | | Imports | | Exports | | Imports | |
| | 1941 | 1940 | 1941 | 1940 | 1941 | 1940 | 1941 | 1940 | 1941 | 1940 | 1941 | 1940 | 1941 | 1940 | 1941 | 1940 |
| **Rice.** | Thousand centals (1 cental = 100 lb.). | | | | | | | | Thousand bushels of 45 lb. | | | | | | | |
| Portugal | 0 | 0 | 19 | 18 | 38 | 2 | 80 | 163 | 0 | 0 | 42 | 41 | 84 | 3 | 178 | 363 |
| Argentina | 0 | 0 | ... | ... | 11 | 6 | [1]) 43 | [1]) 147 | 0 | 1 | ... | ... | 25 | 12 | [1]) 97 | [1]) 326 |
| Peru | ... | ... | ... | ... | [3]) 0 | [3]) 0 | [3]) 73 | [3]) 156 | ... | ... | ... | ... | [3]) 0 | [3]) 0 | [3]) 161 | [3]) 347 |
| Mexico | ... | ... | ... | ... | [4]) 0 | [4]) 0 | [4]) 0 | [4]) 0 | ... | ... | ... | ... | [4]) 0 | [4]) 0 | [4]) 0 | [4]) 0 |
| **Linseed.** | Thousand centals (1 cental = 100 lb.). | | | | | | | | Thousand bushels of 56 lb. | | | | | | | |
| Portugal | 0 | 0 | 0 | 2 | 0 | 0 | 11 | 62 | 0 | 0 | 0 | 4 | 0 | 0 | 19 | 111 |
| Argentina | 1,732 | 742 | — | — | 11,809 | 15,193 | — | — | 3,093 | 1,324 | — | — | 21,087 | 27,130 | — | — |
| **Cotton.** | Thousand centals (1 cental = 100 lb.). | | | | Three months (August 1-October 31) | | | | Thousand bales of 478 lb. | | | | Three months (August 1-October 31) | | | |
| Portugal | 0 | 0 | 75 | 17 | 0 | 0 | 153 | 82 | 0 | 0 | 16 | 4 | 0 | 0 | 32 | 17 |
| Argentina | 0 | 0 | ... | ... | 1 | 97 | [1]) 13 | [1]) 2 | 0 | 0 | ... | ... | 0 | 20 | [1]) 3 | [1]) 1 |
| Peru | ... | ... | — | — | ... | ... | — | — | ... | ... | — | — | ... | ... | — | — |
| | Thousand lb. | | | | | | | | | | | | | | | |
| **Wool.** | | | | | Two months (September 1-October 31) | | | | **Butter.** | | | | Ten months (January 1-October 31) | | | |
| Portugal | 0 | 0 | 9 | 26 | 0 | 0 | 9 | 95 | 37 | 35 | 0 | 0 | 262 | 146 | 0 | 0 |
| Argentina a) | 4,586 | 12,000 | — | — | 10,333 | 20,313 | — | — | 1,601 | 1,087 | — | — | 27,525 | 20,267 | — | — |
| Argentina b) | 5,240 | 5,467 | — | — | 11,868 | 9,345 | — | — | | | | | | | | |
| Peru | ... | ... | — | — | ... | ... | — | — | ... | ... | ... | ... | [3]) 0 | [3]) 0 | [3]) 161 | [3]) 12 |
| Mexico | — | — | — | — | — | — | — | — | — | — | ... | ... | — | — | [4]) 13 | [4]) 22 |
| | Tousand lb. | | | | | | | | | | | | | | | |
| **Cheese.** | | | | | Ten months (January 1-October 31) | | | | **Cacao.** | | | | Twelve months (October 1-September 30) | | | |
| | | | | | | | | | | | | | 1940-41 | 1939-40 | 1940-41 | 1939-40 |
| Portugal | 18 | 24 | 0 | 1 | 256 | 214 | 20 | 31 | 0 | 0 | 192 | 256 | 119 | 29 | 2,597 | 1,349 |
| Dominican Rep. | — | — | — | — | — | — | — | — | ... | ... | — | — | [3])13,336 | [3])15,977 | — | — |
| Argentina | 1,539 | 1,627 | — | — | 23,457 | 7,659 | — | — | ... | ... | — | — | ... | ... | — | — |
| Peru | .. | ... | ... | ... | [3]) 0 | [3]) 0 | [3]) 306 | [3]) 207 | ... | ... | ... | ... | [3]) 0 | [3]) 0 | [3]) 690 | [3]) 437 |
| Mexico | ... | ... | ... | ... | [4]) 42 | [4]) 0 | [4]) 60 | [4]) 207 | — | — | — | — | — | — | — | — |
| **Tea.** | | | | | Four months (July 1-October 31) | | | | **Coffee.** | | | | Four months (July 1-October 31) | | | |
| | | | | | | | | | | | | | 1941 | 1940 | 1941 | 1940 |
| Portugal | — | — | 11 | 13 | — | — | 121 | 68 | 15 | 99 | 465 | 959 | 256 | 1,973 | 1,680 | 5,620 |
| Peru | — | — | ... | ... | — | — | [3]) 192 | [3]) 236 | ... | ... | ... | ... | [3]) 712 | [3]) 51 | [3]) 0 | [3]) 0 |

a) Unwashed wool. — b) Washed wool.
[1]) Up to August 31. — [2]) Up to July 31. — [3]) Up to March 31. — [4]) Up to the end of February.

# STOCKS

## Commercial cereals in store in Canada and the United States.

| Products and location | Nov. 1941 | Oct. 1941 | Sept. 1941 | Nov 1940 | Nov 1939 | Nov 1941 | Oct 1941 | Sept. 1941 | Nov. 1940 | Nov. 1939 |
|---|---|---|---|---|---|---|---|---|---|---|
| | Friday or Saturday nearest 1st of month (1) | | | | | | | | | |
| | thousand centals | | | | | thousand bushels | | | | |
| **Wheat:** | | | | | | | | | | |
| Canadian in Canada | 285,784 | 269,340 | 262,853 | 245,614 | 201,267 | 476,307 | 448,900 | 438,088 | 409,356 | 335,445 |
| U. S in Canada | 498 | 498 | 123 | 695 | 581 | 830 | 830 | 205 | 1,158 | 969 |
| U S in the United States (2) | 168,353 | 169,653 | 164,760 | 105,834 | 90,609 | 280,588 | 282 755 | 274,600 | 176,390 | 151,015 |
| Canadian in the United States | 11,845 | 13,029 | 15,489 | 21,980 | 9,485 | 19,742 | 21,715 | 25,815 | 36,633 | 15,808 |
| Total | *466,480* | *452,520* | *443,225* | *374,123* | *301,942* | *677,467* | *754 200* | *738,708* | *623,537* | *503,237* |
| **Rye:** | | | | | | | | | | |
| Canadian in Canada | 1,740 | 1,387 | 1,116 | 1,645 | 1,703 | 3,107 | 2,476 | 1,993 | 2,938 | 3,041 |
| U S in Canada | 13 | 13 | 13 | 13 | 13 | 24 | 24 | 24 | 24 | 24 |
| U. S in the United States (2) | 9,862 | 9,516 | 8,197 | 4,543 | 5,923 | 17,504 | 16,993 | 14,637 | 8,112 | 10,577 |
| Canadian in the United States | 730 | 844 | 646 | 1,873 | 538 | 1,303 | 1,508 | 1,154 | 3,345 | 961 |
| Total | *12 285* | *11,760* | *9.972* | *8,074* | *8.177* | *21,938* | *21,001* | *17,808* | *14 419* | *14,603* |
| **Barley** | | | | | | | | | | |
| Canadian in Canada | 7,338 | 5,360 | 3,315 | 2,973 | 5,018 | 15,288 | 11,166 | 6,907 | 6,193 | 10,454 |
| U. S in Canada | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 4 |
| U S in the United States (2) | 3,723 | 2 989 | 2,647 | 5,458 | 9,791 | 7,757 | 6,228 | 5,514 | 11,371 | 20,398 |
| Canadian in the United States | 0 | 23 | 42 | 329 | 277 | 0 | 47 | 87 | 685 | 578 |
| Total | *11 061* | *8,372* | *6,004* | *8,760* | *15,088* | *23,045* | *17,441* | *12,508* | *18,249* | *31,434* |
| **Oats** | | | | | | | | | | |
| Canadian in Canada | 3,416 | 2,239 | 1,209 | 2,653 | 3,821 | 10,676 | 6,998 | 3,777 | 8,291 | 11,940 |
| U. S in Canada | 10 | 12 | 17 | 7 | 79 | 30 | 37 | 52 | 21 | 248 |
| U S in the United States (2) | 3,700 | 4,218 | 3 767 | 2,270 | 4,657 | 11,562 | 13,182 | 11,771 | 7,093 | 14,552 |
| Canadian in the United States | 83 | 43 | 139 | 177 | 301 | 259 | 135 | 434 | 552 | 941 |
| Total | *7,209* | *6,512* | *5,132* | *5,104* | *8,858* | *22,527* | *20,352* | *16,034* | *15,957* | *27,681* |
| **Maize** | | | | | | | | | | |
| U. S in Canada | 2,109 | 1,919 | 1,447 | 1,654 | 2,618 | 3,766 | 3,426 | 2,584 | 2,954 | 4,675 |
| Argentine in Canada | ... | ... | ... | ... | 1 | .. | ... | ... | ... | 1 |
| South African in Canada | ... | ... | ... | ... | 1,141 | ... | ... | ... | . . | 2,037 |
| Australian in Canada | ... | ... | ... | ... | 0 | ... | ... | ... | ... | 0 |
| U. S. in the United States (2) | 22,476 | 21,956 | 22,450 | 33,216 | 15.423 | 40,135 | 39,207 | 40,090 | 59,314 | 27,541 |
| Total | .. | ... | ... | ... | *19,183* | ... | ... | ... | ... | *34,254* |

(1) Friday for Canada, Saturday for the United States. — (2) As from August 1941, including 4 central and southwestern markets not reported previously.

## Cotton stocks on hand in the United States.

| Location | Oct. 1941 | Sept. 1941 | Aug. 1941 | Oct. 1940 | Oct. 1939 | Oct. 1941 | Sept. 1941 | Aug 1941 | Oct 1940 | Oct. 1939 |
|---|---|---|---|---|---|---|---|---|---|---|
| | Last day of month | | | | | | | | | |
| | thousand centals | | | | | thousand running bales (counting round as half bales) | | | | |
| In consuming establishments | 9,798 | 8,037 | 8,339 | 6 654 | 7,201 | 1,994 | 1,636 | 1,697 | 1,354 | 1,465 |
| In public storage and at compresses | 65,632 | 56,688 | 45,732 | 68,129 | 76,108 | 13,342 | 11,524 | 9 297 | 13,848 | 15,47[illegible] |
| Total | *75,430* | *64,725* | *54,071* | *74,783* | *83,309* | *15 336* | *13,160* | *10,994* | *15,202* | *16,93[illegible]* |

## Commercial cereals and oilseeds in store in Argentina (1).

| PRODUCTS AND LOCATION | First day of month | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Nov 1941 | Oct 1941 | Sept 1941 | Nov 1940 | Nov. 1939 | Nov 1941 | Oct 1941 | Sept. 1941 | Nov. 1940 | Nov. 1939 |
| | thousand centals | | | | | thousand bushels | | | | |
| Wheat in the ports | 46,831 | 43,850 | 41,587 | 6,173 | (2) | 78,050 | 73,082 | 69,311 | 10,288 | (2) |
| Wheat in other positions | 33,327 | 41,923 | 49,652 | 7,228 | (2) | 55,545 | 69,870 | 82,751 | 12,047 | (2) |
| TOTAL | *80,158* | *85,773* | *91,239* | *13,401* | (2) | *133,595* | *142,952* | *152,062* | *22 335* | (2) |
| Rye | 3,574 | 3,574 | 36,803 | 4,600 | 1,044 | 6,382 | 6,382 | 65,719 | 8,215 | 1,864 |
| Barley | 6,695 | 9,781 | 12 143 | 4,139 | 711 | 13,949 | 20,377 | 25,299 | 8,623 | 1,482 |
| Oats | 1,270 | 1,457 | 1,642 | 2,934 | 2,404 | 3,968 | 4,553 | 5,132 | 9,168 | 7 512 |
| Maize in the ports | 1,830 | 1,628 | 1,786 | 5,816 | 6,226 | 3,268 | 2,908 | 3,189 | 10,386 | 11,119 |
| Maize in other positions | 2,438 | 2,795 | 2,679 | 4,549 | 6,454 | 4,354 | 4,990 | 4,785 | 8,123 | 11,524 |
| TOTAL | *4,268* | *4 423* | *4,465* | *10,365* | *12,680* | *7,622* | *7,898* | *7,974* | *18,509* | *22 643* |
| Canaryseed | 443 | 451 | 450 | 512 | 267 | 791 | 805 | 804 | 915 | 476 |
| Linseed in the ports | 14,601 | 14,458 | 11,782 | 2,661 | 1,139 | 26,074 | 25,818 | 21,039 | 4,752 | 2,035 |
| Linseed in other positions | 9,350 | 11,349 | 14,922 | 2,069 | 497 | 16,696 | 20,266 | 26,647 | 3,694 | 886 |
| TOTAL | *23,951* | *25,807* | *26,704* | *4,730* | *1,636* | *42,770* | *46,084* | *47,686* | *8,446* | *2 921* |
| Sunflowerseed | 5,946 | 6,381 | 6,438 | 2,078 | 647 | 21,235 | 22,788 | 22,991 | 7,423 | 2,309 |

(1) Since July 1941 stocks the property of the "Junta Reguladora de Granos" in the hands of merchants or industrialists are included in the data for wheat, rye, linseed and sunflowerseed. — (2) Figures for wheat in store withheld by Governmental order.

# *PRICES*

## PRICES OF OLIVE OIL IN SPAIN, ITALY AND PORTUGAL.

**Spain.** — The prices of olive oil for the current season, which covers the period November 1, 1941, to October 31, 1942, have been established in a similar way as last year. The following table gives producers' prices, which are for naked merchandise, f. o. r. producer's station, together with comparisons for the preceding years:

| Specification | 1941-42 season | 1940-41 season | 193[illegible] season |
|---|---|---|---|
| | Pesetas per quintal | | |
| Fine oil with acidity under 1° | 415.00 | 415.00 | 289 to 30[illegible] |
| Oil with 1° acidity | 380.00 | 360.00 | 289.00 |
| » » 2° » | 370.00 | 360.00 | 271.50 |
| » » 3° » | 360.00 | 360.00 | 267.50 |
| » » 4° » | 355.00 | 360.00 | 266.4[illegible] |
| » » 5° » | 350.00 | 358.00 | 265.3[illegible] |
| » » 6° » | 347.50 | 356.00 | 264.2[illegible] |
| » » 7° » | 345.00 | 325.00 | 263.10 |

For filtered olive oils of current quality wholesalers may charge, f. o. r. producer's station, 385 pesetas per quintal and for refined olive oils under the same conditions 390 pesetas.

Consumers' prices will be fixed separately for each province.

**Italy.** — Price fixation for olive oil has been done this year according to the same system as last. The ministerial decree of October 31, 1941, however, brings alterations which, in the details, are rather important. Producers' prices, to be paid, free at obligatory collection depot, as from September 16, are established on the basis of a scale different from that adopted last year, which has remained in force for sales from the depot. They are composed of a base price and a premium, paid by the State and which is not included in the price calculation for subsequent sales. For edible oils obtained through normal pressing this premium amounts to 330 lire per quintal. The prices result from the following table:

| Specification | Producers' price (including premium) in lire per quintal |
|---|---|
| Oil with acidity under 0°.8 | 1,550 |
| » » » » 1°.5 | 1,500 |
| » » » » 2°.5 | 1,460 |
| » » » » 3°.5 | 1,440 |
| » » » » 5°.0 | 1,420 |
| » » » » 7°.0 | 1,400 |

Prices for oil with acidity between 6 and 7° are valid only for the provinces of Calabria, Lucania, Sardinia and Sicily.

In subsequent sales of oil the expenses occurring through the activity of the "ammasso" are taken into account. They are calculated as a lump sum and amount for edible oils, to 94 lire per quintal. For these sales the classification in force during preceding years has been maintained. Prices for sales from the collective depots result from the following table which takes into consideration also the sales tax levied as from February 8, 1940 and calculated as a lump sum 36.25 lire during the preceding seasons, 57 lire during the present one. As the prices given refer to the beginning of the season the tax is not included for the year 1939-40. During the past seasons regular price increases took place, now prices remain unchanged.

| Specification | 1941-42 season | 1940-41 season | 1939-40 season |
|---|---|---|---|
| | Selling prices from "ammasso" in lire per quintal | | |
| Finest virgin oil, acidity under 1° | 1 371.00 | 949.25 | — |
| Fine olive oil, acidity under | 1 301.00 | 840.25 | 812.00 |
| Olive oil, acidity under 5° | 1 251.00 | 821.25 | 793.00 |
| Ordinary olive oil, acidity between 5 and 7 | 1 221.00 | — | |

**Portugal.** Although it has been recognised that the cost of production during the current season is higher than it was last year, it has not been considered opportune to increase producers' prices as yields are very promising. Prices for subsequent sales have neither been altered. The various prices result from the following table:

| Specification | Extra oil up to 1° acidity | Fine oil from 1° to 2.5° acidity | Oil for ordinary consumption from 2.5° to 5° acidity |
|---|---|---|---|
| | Escudos per hectoliter | | |
| Sales from producer to wholesaler | 630 | 600 | 560 |
| Sales from wholesaler to retailer | 680 | 645 | 600 |
| Sales from retailer to consumer | 740 | 700 | 650 |

# PRICES BY PRODUCTS.

## Quotations for future delivery.

| Description | Dec 12, 1941 | Dec 5, 1941 | Nov. 28, 1941 | Nov 21, 1941 | Monthly averages: Nov 1941 | Dec 1940 | Dec 1939 | Dec 1938 | Dec 1937 |
|---|---|---|---|---|---|---|---|---|---|
| **Wheat.** | | | | | | | | | |
| Winnipeg (cents p. 60 lb.): | | | | | | | | | |
| delivery December | 74 1/8 | 74 1/2 | 74 1/4 | 73 3/8 | 73 5/8 | 73 1/8 | 81 1/2 | 60 5/8 | 125 |
| ,, May | 78 1/2 | 78 | 77 3/4 | 77 | 77 1/4 | 76 7/8 | 85 1/2 | 62 1/2 | 116 3/4 |
| ,, July | 79 3/4 | 79 1/4 | 75 1/8 | 78 1/4 | 78 5/8 | 78 5/8 | 86 1/2 | 63 1/8 | 111 |
| Chicago (cents p. 60 lb.): | | | | | | | | | |
| delivery December | 126 3/8 | 117 3/4 | 113 1/4 | 114 1/4 | 114 7/8 * | 89 1/8 | 100 1/2 | 63 7/8 | 95 1/8 |
| ,, May | 129 3/4 | 122 3/4 | 119 | 119 5/8 | 120 1/4 | 85 1/4 | 98 3/4 | 67 1/8 | 91 5/8 |
| ,, July | 130 1/8 | 123 | 119 1/4 | 120 1/8 | 120 7/8 | 80 1/4 | 96 1/4 | 67 | 85 3/4 |
| Buenos Aires (paper pesos p. 100 kg.): | | | | | | | | | |
| delivery February | .. | .. | ... | .. | .. | 6.80 | 8.10 | 7.00 | 11.24 |
| ,, March | .. | .. | .. | .. | .. | 6.83 | 8.24 | — | 11.29 |
| ,, April | .. | .. | .. | | .. * | 6.88 | — | — | — |
| **Rye.** | | | | | | | | | |
| Winnipeg (cents p. 56 lb.): | | | | | | | | | |
| delivery December | 60 | 58 3/4 | 58 | 58 1/4 | 58 3/8 | 45 1/8 | 72 | 39 1/8 | 75 1/8 |
| ,, May | 62 7/8 | 62 3/8 | 61 5/8 | 61 1/4 | 61 1/2 | 48 7/8 | 74 1/8 | 41 1/4 | 77 3/8 |
| ,, July | 63 1/4 | 62 7/8 | 62 | 61 1/2 | 62 | 49 3/4 | 73 1/8 | 42 1/4 | 76 3/8 |
| Chicago (cents p. 56 lb.): | | | | | | | | | |
| delivery December | 69 | 65 1/2 | 62 3/8 | 64 3/4 | 65 * | 42 7/8 * | 62 1/2 | 41 1/8 * | 68 1/4 |
| ,, May | 75 3/8 | 71 1/4 | 69 1/8 | 71 1/4 | 71 1/2 | 46 3/4 | 67 1/4 | 45 1/4 | 70 1/8 |
| ,, July | 77 3/8 | 73 7/8 | 71 | 72 7/8 | 73 1/4 | 47 3/4 | 66 7/8 | 45 1/2 | 66 1/4 |
| **Barley.** | | | | | | | | | |
| Winnipeg (cents p. 48 lb.): | | | | | | | | | |
| delivery December | 60 1/4 | 60 3/4 | 58 5/8 | 57 5/8 | 57 1/2 | 43 3/8 | 49 | 37 7/8 * | 59 |
| ,, May | 60 5/8 | 61 | 59 1/2 | 58 7/8 | 58 1/2 | 44 | 50 1/2 | 38 5/8 | 59 1/2 |
| ,, July | 59 1/2 | 60 1/8 | 58 5/8 | 57 7/8 | 57 3/8 | 42 1/8 | 49 3/4 | 37 7/8 | 57 5/8 |
| Minneapolis (cents p. 48 lb.): | | | | | | | | | |
| delivery December | ... | ... | ... | ... | .. | 42 * | 40 1/2 | 32 1/4 * | 46 1/2 |
| ,, May | ... | ... | ... | ... | ... | 41 3/4 | 42 3/8 | 34 3/8 | 46 1/8 |
| **Oats.** | | | | | | | | | |
| Winnipeg (cents p. 34 lb.): | | | | | | | | | |
| delivery December | 47 1/8 | 45 1/4 | 44 3/8 | 44 1/4 | 44 1/4 | 32 3/4 | 38 1/8 | 28 1/2 | 47 3/4 |
| ,, May | 46 3/4 | 46 | 45 | 45 1/4 | 45 1/8 | 32 3/8 | 38 | 29 | 46 1/4 |
| ,, July | 46 | 45 1/8 | 44 1/4 | 44 1/8 | 44 1/8 | 31 1/8 | 37 3/8 | 28 5/8 | 43 5/8 |
| Chicago (cents p. 32 lb.): | | | | | | | | | |
| delivery December | 52 3/4 | 50 1/4 | 48 3/8 | 49 5/8 | 49 3/4 * | 38 7/8 * | 39 3/4 * | 27 5/8 * | 31 1/2 |
| ,, May | 56 7/8 | 54 1/8 | 52 1/4 | 52 3/4 | 52 5/8 | 35 3/8 | 38 1/4 | 28 5/8 | 30 1/2 |
| ,, July | 55 1/2 | 52 7/8 | 51 | 51 1/4 | 51 1/8 | 31 7/8 | 34 | 27 5/8 * | 29 1/4 |

* Indicates that the product was not quoted during part of the period under review.

| Description | Dec 12, 1941 | Dec 5, 1941 | Nov 28 1941 | Nov 21, 1941 | Monthly averages: Nov 1941 | Dec 1940 | Dec 1939 | Dec 1938 | Dec 1937 |
|---|---|---|---|---|---|---|---|---|---|
| **Maize.** | | | | | | | | | |
| Chicago (cents p 56 lb) | | | | | | | | | |
| delivery December | 79 3/4 | 75 1/2 | 73 1/8 | 74 | 75 1/8 | * 60 1/8 | * 54 1/4 | * 49 1/4 | * 56 5/8 |
| „ May | 85 | 81 1/4 | 79 1/2 | 80 | 81 1/8 | 60 3/8 | 56 5/8 | 52 1/4 | 59 3/8 |
| „ July | 86 1/8 | 83 1/8 | 81 1/4 | 81 3/4 | 82 7/8 | 60 3/8 | 56 7/8 | 53 1/8 | 59 3/4 |
| **Linseed.** | | | | | | | | | |
| Winnipeg (cents per 56 lb) | | | | | | | | | |
| delivery December | 158 3/4 | 151 3/4 | 152 1/8 | 150 5/8 | 150 3/4 | 130 3/4 | 176 5/8 | 144 1/8 | 170 1/4 |
| „ May | 161 | 155 3/4 | 155 1/4 | 154 1/4 | 153 1/4 | 134 7/8 | 180 3/8 | 140 7/8 | 171 7/8 |
| „ July | 161 5/8 | 155 3/4 | 155 3/4 | 154 1/2 | 153 1/2 | 136 1/8 | 179 1/8 | — | – |
| Duluth (cents p 56 lb) | | | | | | | | | |
| delivery December | | | | | | n 158 1/4 | 189 | * 182 1/4 | * 196 3/8 |
| „ May | | | | | | — | 199 1/4 | * 187 | 198 5/8 |
| Buenos Aires (paper pesos p 100 kg) | | | | | | | | | |
| delivery February | | | | | | 9 41 | 16 55 | 13 73 | 15 07 |
| „ March | | | | | | — | 16 69 | * 13 69 | 15 12 |
| „ April | | | | | | * 9 55 | — | — | – |

* Indicates that the product was not quoted during part of the period under review

## Prices in Buenos Aires (spot prices).

(Paper pesos per 100 kg)

| Description | Dec 11, 1941 | Dec 4 1941 | Nov 27, 1941 | Nov. 20, 1941 | Nov 1941 | Dec 1940 | Dec 1939 |
|---|---|---|---|---|---|---|---|
| *Wheat* No 2, Hard Winter 78 kg per hl | (1) 6 75 | (1) 6.75 | (1) 6 75 | (1) 6 75 | 6.87 | 6 75 | 7 |
| *Oats* No 2, White, 49 kg per hl | 5 20 | 5 30 | 5 20 | 4 90 | 4 82 | 3 71 | 5 |
| *Linseed* No 1 | (2) 9 25 | (2) 9 25 | (2) 9 25 | (2) 9 25 | — | 9 37 | 17 [illegible] |

(1) Basic price fixed by Governmental order As from Dec 5, 1940, the same price has been fixed for "half soft" and "soft" qualities — (2) Basic price fixed by Governmental order for linseed No 2

Prof. Ugo Papi, *Segretario generale dell'Istituto, Direttore responsabile.*

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# AGRICULTURAL SCIENCE AND PRACTICE

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# ARTIFICIAL DRYING OF GREEN FORAGE CROPS

SUMMARY: I – Importance of artificial drying of green forage — II – The production of young grass and other green forage crops with a view to artificial drying — III – Artificial drying and other methods of conserving green forage — IV – Technique of artificial drying of green forage. — V. – The nutritive value of artificially dried green fodders and their utilization in stock-feeding — VI – Bibliography.

*In one of its Resolutions, the XIVth General Assembly of the International Institute of Agriculture (May 23-28, 1938) expressed the wish that henceforth the Institute would give greater attention to present-day problems of animal nutrition. The question has since been studied very fully, all the more so in that, as a result of the war and the present international situation, fodder economy has become one of the most difficult and important problems of agriculture. No other branch of agricultural production presents such profound changes.*

*It was proposed in the articles recently published on the subject of animal nutrition to discuss some of the technical problems which characterize the evolution. Under changed conditions, new methods have to be adopted and among these, the artificial drying of green forage crops seems one of the most important. A study of the problems involved, therefore, appears justified. The following articles which, in their ensemble, treat on the subject from different aspects, were written with a view to giving readers a general conception of the question.*

## I.

## IMPORTANCE OF ARTIFICIAL DRYING OF GREEN FORAGE

Dr. István Moskovits.

In general, it is not easy to recognize the true importance of a new process from the literature regarding it. This is exactly the case for the artificial drying of green forage crops: there is a very large number of articles and special publications pro and contra which certainly shows the interest taken in this process but at the same time somewhat complicates our task, consisting in establishing the importance which should be attributed to it for agricultural production in general and the farming of today in particular.

It is perhaps exaggerated to speak of artificial drying as a new process (1) *. The fundamental basis of this process, that is, the conservation of forage by removing artificially the moisture content, is not recent; artificial drying moreover, has already been practised for a fairly long time, experimentally at least. During the 1914-1918 world war, this process was more or less general, but, during the post-war period, interest declined and the drier installations (most of which no longer met modern requirements) frequently remained inactive.

At the same time, however, in consequence of the active propaganda in favour of the intensive utilization of herbage, exhaustive studies were made and attention was again turned to the very high protein content of young grass. Numerous experiments have shown that this grass is a forage much superior to ordinary grassland hay used for the winter feeding of stock. As is known, the older the grass when cut, the poorer the hay in protein; other experiments made with a view to determining the quantities of nutrients the herbage would supply with heavy manurial applications and frequent cutting, also showed that despite a decrease in total yield under these conditions, the forage was richer in protein and more digestible.

To conserve a forage of this type, artificial drying is necessary, otherwise the loss in young shoots and leaves, the most valuable part of forage plants, counterbalance the advantages obtained. Analyses and nutrition tests have also shown that the forage obtained in this way can, in many respects, compare favourably with feed concentrates.

The innovation realized by up-to-date artificial drying of green forage, therefore, lies less in the process itself than in the use of a raw material composed of young forage plants, rich in protein, which, after drying, furnishes a sort of concentrate feed. Prospects appeared so promising that artificial drying of green forage was considered as a revolutionary change in farming methods.

At first sight, such an opinion seems highly exaggerated. The question is involontarily raised as to how such importance can be attributed to an innovation apparently so simple.

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* The numbers in brackets refer to the bibliographical list, p. 274.

## Advantages of artificial drying

This process aims not only at conserving large quantities of young forage but even more so at obtaining a new forage product in the farm itself, rich in nutrients and in concentrated form, which, especially today, is of decisive importance.

Attention has already been called on several occasions to the most difficult task in attaining self-sufficiency in fodder supplies, that is, the production of concentrated feeds rich in protein, (2), a problem which is highly importance in war time. The majority of the forages produced on the farm have, in fact, such a low protein and such a high fibre content that, if high production is aimed at from the stock, the ration will either have too little protein or, in the contrary case, will have so much fibre that it will exceed the consumption capacity of the stock. As it is impossible to give the stock the concentrates formerly employed or, if available, only on a very reduced scale, other means have to be found in order to satisfy protein requirements.

It is primarily from the young plant that a large quantity of protein can be obtained rapidly and relatively cheaply. In this respect, large reserves are found in permanent herbage and catch crops. These protein fodders, however, are only available at certain periods of the year; to utilize them throughout the year, they must be conserved, consequently, the problem of protein supply becomes a question of preserving these forage crops for the winter and times of scarcity. It is necessary, however, to employ a process which will maintain the forage protein with as little loss as possible.

These brief indications would suffice to show the importance of artificial drying for self-sufficiency and war economy. It would naturally be absurd to propose this process as panacea for the solution of the problem of protein supply, but in any case, it makes a valuable contribution both as regards quantity and as a seasonal supplement.

These are far from being the only advantages. With artificial drying, fuller advantage can be taken of the herbage growth, the excess herbage can be utilized without loss and larger quantities of nutrients can be produced from a smaller grass area. On the other hand, losses in dry matter and protein are reduced to a minimum; the quality of the coarse fodder is improved and a concentrated forage is obtained with a very high vitamin A content. Finally, there is less risk of the forage becoming soiled and it is more easily stored.

The following table reproduces the data published by the Swiss Federal Department of Public Economy, Department of Agriculture (3); it compares the productivity of different forage crops and shows that, per hectare of cultivated area, it was from artificially dried grass that the highest nutritive values were obtained.

The use of artificially dried forage makes for a more rational diet, especially in winter. It is very important, particularly for regions where green forage serves not only for maintenance but also for production purposes and where the problem of winter feeding is far from easy: there is generally enough hay but concentrates have to be added, especially if higher yields are desired. The following facts are very important: to the smaller volume of artificially dried forage corresponds

TABLE I. — *Comparative productivity of different forage crops.*

| Quantity obtained per ha. | | Starch equivalent | Digestible protein |
|---|---|---|---|
| Artificially dried grass | 100 qls | 5000 kg | 1000 kg |
| Hay | 90 | 3300 | 450 |
| Oats | 25 | 1500 | 200 |
| Barley | 22 | 1540 | 154 |
| Potatoes | 200 | 4000 | 100 |

a relatively higher nutrient content—this forage has no adverse influence on the quality of animal products—in the regions producing hard cheese, where the use of silage is prohibited, artificially dried grass could be employed.

To the advantages mentioned regarding the technique of production and nutrition may be added others of a general character: for example, surplus green fodder which remains unsold as such, can be made into a preservable forage which can be placed on the market and easily transported, thus procuring the possibility of establishing a balance between regions with an excessive forage production and those with an insufficient output.

## Production problems

This product, therefore, is very advantageous for farming and is, moreover, of considerable present interest. On the other hand, however, the question may be raised as to whether this process of conservation is sufficiently perfected for its use to be generally advocated. In fact, on the farm, it raises problems, the solution of which will decide if the advantages of the process compensate the expense and work involved.

The chief problems which arise regard the production of the material to be dried. The utilization of grass and the frequent cuttings necessary, in the long run are only possible if adequate growth conditions can be assured as, for example, by supplying plant nutrients by means of manurial applications and plentiful watering. Climatic conditions exert an important influence but, even in the most favourable instances, the effect of frequent cutting on the grass cover should be carefully studied. Studies should also include the other forage plants which can be taken into account as, very probably, the botanical composition of the plant cover is very important. In any case, it is evident that only plants of a high nutritive value should be dried as it would be illogical to submit a raw material of low value to a process in itself expensive.

To obtain full use of a drying plant, it should be worked without interruption; it is necessary, therefore, to organize the production of the raw material in such a way that a certain quantity of given plants which should correspond to the capacity of the drier, attains the stage required for cutting. This is a postulate which is extremely difficult to satisfy as its realization depends on the economic standing of the farm. From the cultural viewpoint, the best means consist primarily in a judicious selection of the species and types of plants com-

posing the forage cover; intercalary or catch crops also form a valuable addition. On the other hand, in late autumn, the drying of beet leaves, etc. would not only furnish a valuable fodder, but would also help in paying off the cost of the drying plant.

In short, the possibility of employing the dry material as fodder will decide the question of production. We thus come to the problems which artificial drying imposes on the *science of animal nutrition*.

The research work carried out in this field is already very advanced; its tendency is shown by the numerous publications regarding: determination of nutrients, digestibility and nutritive value, vitamin content and its effects. Numerous feed tests already supply a practical basis for the feeding of dairy cattle and the rearing of young stock. The solution of other problems is still more or less in the experimental stage and further study is necessary. The chief problems to be elucidated regard: the maximum period during which stock may be given artificially dried forage without adversely affecting condition—the maximum quantity of this herbage which can be given daily without their losing condition and without wastage of the herbage in question—the influence of forages with a high vitamin content on the quality of animal products and the effects of the latter on human nutrition.

To obtain a good final product, a good drying plant is necessary. The technical progress made in recent years in artificial drying (reduced working costs, improved product, decrease in nutrient losses) has led to an improved type of drier. This improvement is characterized by the tendency to construct driers not exclusively for the treatment of green fodders but serving also for the drying of other products. The motive for the construction of these 'universal driers' is economy in working costs; the longer period over which a drier can be utilized, the more profitable it is, and even small excess losses can be covered if the plant can be used for different purposes. Other question studied by constructors is decrease in power consumption in order to raise earning-capacity; if it is taken into account that approximately 50 per cent. of drying costs are for fuel (see p. 244), it is easily seen that any economy in this respect makes for an appreciable reduction in the general costs. Besides the problem of drier construction, that which is of primary importance is the organization of forage transport and the construction of machines *ad hoc* (cutlifts).

The adoption of artificial drying, however, does not depend exclusively on the absolute advantages it presents. Very important in this respect are also the *advantages relative to other methods of conservation*: haymaking and ensilage, regarding artificial drying. This question cannot be settled at first sight either: a comparison of loss in nutrients, palatability, quality and quantity of the final product on the one hand, with, on the other, the necessary capital and current expenses, which furnish a basis on which to decide to what extent the different processes may be employed. Evidently, it would be a serious error to consider the different methods of conservation as concurrent. This is not so, rather they complete each other and, apart from very special cases, it is very seldom that all the green forage not given to stock in the fresh state is dried artificially. Moreover, it would be very difficult to dry at the same time all the green fo-

rage available without employing an excessively large drier which would not be justified from the economic viewpoint. It is necessary, therefore, to effect a rational division and change into hay or silage the herbage which cannot be dried artificially. On the other hand, in stockfeeding, it is frequently an advantage not to employ conserved green forage in the form of the artificially dried product alone.

Mention has just been made of the correct size of a drier from the economic and technical viewpoint. The size naturally has to be determined according to the various requirements; the question has also to be studied, however, as to whether a farm can support the upkeep expenses of a drier, whether a cooperative system would be advisable or whether it would be more advantageous to have drying done on an industrial scale. The earning capacity of a drier will frequently depend on whether it is properly worked and whether it is utilized for a fairly long period it the year. In Germany, for example, the Reich grants subsidies for the construction of driers provided that they are worked for at least 1500 hours during the year. This is not possible unless, besides green forage and beet leaves, other products (potatoes, beet cossettes) are utilized for drying.

The problems regarding the artificial drying of green forage crops and which have only been lightly touched upon, are in reality very numerous and extremely complex. In the following articles, an andeavour is made to treat on the chief questions relative to this subject and to indicate the state of our present knowledge. It is evidently impossible to reply in a general way to the question of the importance and utility of this new system. Its earnihg capacity from the viewpoint of private economy, its justification from the politico-national standpoint (self-sufficiency, war economy), as well as a close examination of the advantages it presents and the difficulties it raises, will all influence, in each case, the decision to be made. The series of articles which follows aims at supplying the necessary basis for a comprehensive understanding of the different problems involved.

## II.

## THE PRODUCTION OF YOUNG GRASS AND OTHER GREEN FORAGE CROPS WITH A VIEW TO ARTIFICIAL DRYING

A. Hanck, Agr. Engin., Gx.

The introduction of the modern system of artificial drying of green forage in farming raises new problems as regards plant production. The solution of these problems varies from one country to another and also depends on the type of green forage to be dried.

The drying of young grass, a practice which has spread considerably in recent years, occupies a special place in this new method of producing high

quality feedstuffs. At the same time, the drying of other green crops and secondary products (beet leaves, etc.) plays an important part; however, in this field also, in forage production account has to be taken of the requirements of the new method of conservation in order to fully utilize the advantages it presents.

The problems to be solved are not identical in each case. The main problem is to produce uninterruptedly and with a maximum yield, forage particularly rich in albumin and poor in fibre, in such a way as to assure a continuous working of the driers.

**Young grass**

The composition of the dry matter of grass varies according to stage of growth. In spring and summer, good meadow pasture is sufficient to fatten stock and to meet the requirements of high-yielding milch cows, without the necessity of concentrates, which shows the difference in its composition at this stage and at a later stage when cut for hay. In 1909, FALKE (4) found, from about 1000 analyses, an average content of 22 per cent. crude protein in the dry matter of meadow grass, with extremes of 20.2 and 32.4 per cent. The studies of NEUBAUER confirmed these figures and were seen in the intensive farming methods introduced at the Hohenheim Institute from 1915.

In 1925, WOODMAN (5, 6, 7, 8, 9, 10, 11, 12, 13, 14 and 15) untertook a long series of systematic trials with a view to determining the influence of method of cultivation on the composition of the grass. In these trials, the grass was cut at intervals varying from one, two, three weeks, a month and five weeks. On an average, the grass cut every week contained about 24.75 per cent. of crude protein; cut every two weeks: 23.5 per cent.; every three weeks: 21 per cent.; with monthly cutting, the average content was 19.35 per cent. and dropped to 18.30 per cent. with 5-weekly intervals.

During April, the beginning of May, the influence of frequency of cutting is minimum and the crude protein content remains considerably above 20 per cent. in all cases. The difference becomes more apparent during the period of vigorous growth, in May-June and is particularly felt when there is a delay of a month or over between two consecutive cuttings. With intervals of five weeks, the crude protein content fell to 13-14 per cent.

The following table summarizes the variations in nutritive value of grass with different frequencies of cutting.

The average crude protein content remains high, even with cutting every 5 weeks; in this case, however, the figure for the average content has only a relative value, as it was obtained by calculating the average between the different cuttings without taking into account the weight of the crop at each cutting. In practice, there is much more grass produced which touches the lower limit.

Numerous other experiments confirm these results; for example, the tests made at the Federal Station of Agricultural Research, Zurich-Oerlikon (17).

TABLE 2. — *Crude protein content and nutritive value of grassland herbage with different frequencies of cutting* (H. E. WOODMAN and D. B. NORMAN) (11).

| Frequency of cutting | Crude protein % | | Digestible crude protein % | | Starch equivalent in lb. per 100 lb. | |
|---|---|---|---|---|---|---|
| | Average | Range | Average | Range | Average | Range |
| Weekly | 24.74 | 21.20-27.92 | 19.97 | 16.25-23.45 | 67.74 | 62.04-73.70 |
| Fortnightly | 23.48 | 21.31-27.93 | 18.75 | 17.09-20.82 | 69.87 | 67.79-73.75 |
| 3-weekly | 21.14 | 19.29-24.89 | 16.66 | 15.12-18.31 | 69.39 | 67.15-772.72 |
| Monthly | 19.35 | 17.20-23.52 | 14.70 | 12.98-19.31 | 67.05 | 64.30-70.60 |
| 5-weekly | 18.33 | 14.13-24.66 | 13.59 | 10.29-18.82 | 64.68 | 61.53-68.62 |

Taking the digestible protein value and the total nutritive value (in this case, value for milk production) of the youngest grass as 100:

| | Protein content | Total nutritive value |
|---|---|---|
| Grass cut every week | 100 | 100 |
| ,, ,, ,, 2 weeks | 78 | 95 |
| ,, ,, ,, 4 » | 62 | 90 |
| ,, ,, ,, 6 » | 48 | 86 |
| ,, ,, ,, 8 » | 44 | 82 |

The other constituents of the dry matter vary at the same time and in general, it is found that while the protein decreases, the same is true for ether extract and carotene, while the fibre increases and lignification —which up to three weeks does not occur—takes place and affects the digestibility of the fibre and organic matter. In the experiments of WOODMAN, the average fibre content amounted to 12.2 per cent. with weekly cuttings, 21.6 per cent. with monthly cuttings and 21.9 with cuttings every five weeks.

Another characteristic of young grass is the presence of water-soluble carbohydrates (15). Preliminary experiments made at Rothamsted on the changes in the composition of raygrass during the various stages of growth showed the presence of an appreciable quantity of a water-soluble carbohydrate, highly assimilable, of the fructose type. A detailed study of grass samples cut at intervals of a week, revealed the presence of this soluble carbohydrate up to 30 per cent. and its disappearance with the maturation of the grass. It seems that this soluble carbohydrate helps the growth of the plant in maturing and, by a process of retrogradation, contributes to the formation of the fibre to its own detriment, after the dry matter of the plant has attained its maximum.

The stage of growth affects the vitamin content of the grass (17, 18, 19, 20, 21, 22). Particular attention has been given to the variations in carotene or provitamin A content. Experiments on perennial ryegrass carried out at Jealott's Hill showed that the carotene content of grass is maximum when it is mature enough to be grazed and that conditions are optima for the growth

and formation of leaves (50-60 mg. of carotene per 100 g dry matter), this percentage falls to 20 mg. per 100 g during normal flowering stage Weather conditions have an important influence on the carotene content which, under adverse conditions, may drop to 15 mg per 100 g. White clover has a more even carotene content which does not decrease so markedly at the time of cutting for hay (24 mg. per 100 g dry matter).

Nitrogenous fertilizers increase the carotene content of grasses throughout the growth period (18, 22) at the rate of 6 to 21 per cent. No appreciable difference is obtained with clover.

The following table indicates the variation in carotene content observed at Jealott's Hill with monthly cuttings (18).

TABLE 3 — *Carotene content of perennial ryegrass and white clover cut monthly (in mg. per 100 g. dry matter).*

| Date of cutting | May 2, 1934 | May 23, 1934 | July 2, 1934 | August 1, 1934 | September 3, 1934 | October 2, 1934 |
|---|---|---|---|---|---|---|
| Ryegrass | | | | | | |
| with nitrogen | 55.1 | 51.2 | 31.0 | 51.3 | 42.3 | 36.3 |
| without nitrogen | 47.8 | 44.1 | 20.2 | 32.3 | 29.4 | 25.3 |
| Clover | | | | | | |
| with nitrogen | 43.4 | 34.0 | 28.3 | 30.1 | 42.0 | 40.5 |
| without nitrogen | 43.3 | 40.4 | 28.5 | 27.1 | 40.9 | 42.0 |

There seems to be a close relation between the crude protein and the carotene content (22) In this connexion, PAGE gives the following figures (19)

Crude protein in dry matter over 20 per cent carotene content 49 mg. per cent

Crude protein content in dry matter between 15 and 20 per cent. carotene content 37 mg. per cent

Crude protein in dry matter between 10 and 15 per cent. carotene content 23 mg. per cent.

Mention has also been made of the presence in young vigorous grass of a growth factor which would seem to differ from the other known vitamins and to which should be attributed the stimulation of milk flow when cows are put out to spring pasture (23)

## Production of young grass and factors affecting yield and quality

Influence of frequency of cutting. – For grass to have a high nutritive content throughout the season, it is essential to cut it frequently. In practice, cutting is advocated when the grass is 15-20 cm. high. Frequency of cutting has not the same influence on yield as on quality and the total production of dry matter per unit surface area is greater when two cuttings only are made (hay and aftermath), than with more cuttings. The more frequent the

cuttings, the less the dry matter. WOODMAN, for example, obtained the following results in 1928 (8):

| System of cutting | Dry matter per acre in lb. |
|---|---|
| Weekly | 1,982 |
| Fortnightly | 2,562 |
| 3-weekly | 3,216 |
| Hay plus aftermath | 6,655 |

In Cheshire, GREENHILL (cited by E. J. ROBERTS) in 1931 obtained (24):

| System of cutting | Dry matter per acre (in cwt.) |
|---|---|
| 3-weekly | 56.1 |
| 4-weekly | 68.6 |
| 5-weekly | 79.3 |

If, instead of the dry matter, the nutrient content is considered, the result is different. In the experiments made by WOODMAN (5) for example, hay and aftermath harvested in the usual way, despite the difference in yield of dry matter, only gave the same starch equivalent as grass cut weekly and the protein yield only represented 2/3 of that obtained in the latter instance. In the young grass the nutrient elements are condensed while in hay they spread out through a large mass of inert matter and often reduced in quantity. This phenomenon already occurs when instead of 4-weekly, 5-weekly cuttings are effected.

In this case, WOODMAN obtained (11):

Monthly cuts. 5,749 lb. dry matter containing 3,852 lb. starch equivalent with 811 lb. digestible protein per acre.

5-weekly cuts: 6,540 lb. dry matter, containing 4,174 lb. starch equivalent with 824 lb. digestible protein per acre. In extending the frequency of cutting from a month to five weeks, an increase was obtained of 791 lb. in dry matter, 327 lb. in starch equivalent and 13 lb. in digestible protein per acre.

Hence, the risk lies not in cutting the grass too short but when it is too mature and the least delay, especially during the period of vigorous growth, causes a marked decline in the value of the product which, therefore, no longer comes up to standard.

The trials made at Zurich-Oerlikon (17) cited earlier on confirm these conclusions; the following differences in yield of dry matter were found:

| | Yield in dry matter (most frequent cutting = 100) |
|---|---|
| Weekly cuts | 100 |
| 2-weekly cuts | 528 |
| 4-weekly cuts | 726 |
| 6-weekly cuts | 848 |
| 8-weekly cuts | 891 |

From these figures and those cited previously, the relative yield in digestible protein and total nutritive value may be estimated:

| | Relative yield in digestible protein | Relative yield in total nutritive value |
|---|---|---|
| Weekly cuts | 100 | 100 |
| Fortnightly cuts | 412 | 496 |
| 4-weekly cuts | 450 | 639 |
| 6-weekly cuts | 407 | 712 |
| 8-weekly cuts | 392 | 704 |

The highest gross weight was obtained with 8-weekly cuts; the highest yield in total nutritive value with 6-weekly cuts and the highest protein yield with 4-weekly cuts.

Fertilizers do not increase the yield obtained with frequent cuts to the same extent as with more widely spaced cutting as seen from the experiments by FAGAN (24).

Without fertilizer. weekly cuts: 1,225 lb. per acre; monthly cuts 3,401 lb. per acre.

With fertilizer. weekly cuts: 1,660 lb. per acre, monthly cuts. 5,148 lb. per acre.

The question of fertilizers will be discussed further on.

*Action of frequent cutting on sward.* — Most English experts agree that grassland cannot be cut frequently over more than one season. They consider that the grass cover would be exhausted with a consequent drop in yield in the following years. In some instances this has been found true. E. J ROBERTS (24) in this respect cites the observations of GREENHILL at Jealott's Hill where, after two years of frequent cutting, grass plots had to be set aside owing to the damage incurred. Many of the best grass species had disappeared, their place being taken by others of less value and the soil had become acid. It should be pointed out, however, that the soil was not in good condition at the beginning of the experiment and that the herbage was very close cropped. In another experiment regarding the action of irrigation and nitrogenous fertilizers, GREENHILL found that at the end of the season, the grasses appeared to have lost all vigour; perennial ryegrass, for example, seemed incapable of maintaining normal growth.

STAPLEDON and BEDDOWS (25) found that grassland only cut twice (hay and aftermath) in a year, in the April of the following year gave 20 percent more forage than a plot cut frequently; an examination of the roots in both cases showed that there were 30 per cent. less roots in the latter than in the former instance.

These observations, however, do not make the rule. The quality of the herbage, condition in which maintained, nutrient content, fertilizer application both chemical and organic, all play an important part, and examples are not wanting of good grassland cut frequently for several successive years without showing any signs of exhaustion and degeneration.

Plant species vary in their reaction to frequent cutting. STAPLEDON and BEDDOWS (25) noted that plots of cocksfoot cut frequently in one season gave, during the following season, lower yields than those merely cut twice (hay and aftermath). They observed, however, that the reaction of pure lines of cocksfoot varied considerably, some being more resistant than others. ROBERTS ALUN and I. V. HUNT (26) noted that the food reserves of perennial ryegrass accumulate in the roots, which may be a decisive factor in its resistance to frequent cutting. On the other had, timothy grass stores its food reserve in the bulbous base of the stem and perhaps this explains why it cannot stand intensive grazing. The length to which the herbage is cut may also be important and is one of the problems which merits further study.

In contrast to many grasses, white clover benefits by repeated cutting, as has been shown by experiments made at Cambridge. Frequent cutting as also frequent grazing stimulates the growth of leguminous species with their consequent increase in proportion of the grassland cover.

It may be concluded, therefore, that the English investigators consider that the best total results are obtained by alternating frequent cuttings with grazing and the production of ordinary hay. Others think that it is unnecessary to reserve special plots throughout the year for the drying of herbage and that it is preferable to graze them for part of the season. The minority, however, is of the opinion that these plots should be set aside, as far as possible, for the production of grass to be dried artificially, as there is less danger of introducing impurities such as; dead herbage, soil, etc. STAPLEDON (27) considers that 5 cuttings are excessive for permanent pasturage and also for temporary meadowland over any period. A great advantage is to let the root system of the grass attain vigorous growth any time between May and October. The solution lies in letting the grass grow sufficiently and that successively in each of the plots available so that none of them are cut 5 times in two successive years.

Whatever the method followed, there is a period, in May-June, when there is an excess and another, July-August, when there is little owing to falling-off in vegetation.

Proportion of stems and leaves. — FAGAN (29) found that the leaves have a much higher nutritive value than the stems, this is the chief reason for the richness of young grass. The following figures show the crude protein content of the leaves and stems of cocksfoot.

Relative crude protein content of the dry matter of cocksfoot stems and leaves:

| | March 26, 1923 | May 3, 1923 | June 19, 1923 | August 16, 1923 |
|---|---|---|---|---|
| Stem . . . . . . | 17.38 % | 17.62 % | 9.38 % | 7.88 % |
| Leaves . . . . . . | 26.81 % | 23.56 % | 13.44 % | 15.06 % |

The proportion of stems in the grass cover increases as the intervals between cutting lengthen and the appearance of stem material is generally considered as an indication of reduction in quality. During the dry season, however, grasses have a tendency to produce stems, even if growth is insufficient to assure a cutting.

In temporary meadows, the proportion of leaves to stems is greater than in grassland and MARTIN JONES (30) observed a ratio of 2.3 to 1 in the former case and 1.4 to 1 in the second.

Action of fertilizers on yield and quality. — The effect of nitrogenous fertilizers on yield of young grass depends on various factors which are difficult to distinguish separately or make evident. Caution should also be observed in judging trials and any tendency to excessive generalization avoided.

WOODMAN and UNDERWOOD (10) only obtained limited results with tho application after each cutting of a small quantity of ammonium sulphate; on an average of two years experiments, the plots having received manure, phospho-potassic fertilizer and lime gave 90 per cent. of the yield, expressed in dry matter of the plots give complete fertilizer applications. Nitrogenous fertilizers did not have much effect on the crude protein content.

With larger doses of ammonium sulphate, GREENHILL [cited in (24)] obtained more pronounced increases in yield During the course of 2 years' experiments at 16 different centres, the yield in dry matter of plots with nitrogen varied between 16 9 and 59 cwt. per acre, with an average of 42.2 cwt. With nitrogenous fertilizer, the yield in dry matter varied between 21 4 and 71.5 cwt. per acre with an average of 47.8 to 55.4 cwt. according to the amount of ammonium sulphate employed The monthly application of 1 cwt. of fertilizer increased yield in dry matter by 27 per cent. The action of nitrogen on the composition of the dry matter is not so appreciable, the application of 2 cwt. of ammonium sulphate after each cutting increased yield in dry matter by 31 per cent. and in crude protein by 36 per cent.

TABLE 4. — *Productivity of swards (plots) when mown every four or five weeks and the influence of manuring on yields.*

| Authors | Year | No. of centres | Manuring | Yield of dry matter, cwt per acre: No manure plots | Yield of dry matter, cwt per acre: Manured plots | Percentage increase due to manures |
|---|---|---|---|---|---|---|
| Development Commission . . | 1928 | 14 | Nil | 28 3 | — | — |
| idem . . . | 1929 | 14 | Complete | 23 3 | 37.0 | 58 3 |
| idem . . . | 1930 | 14 | N. | 29.4 | 42.7 | 45 3 |
| idem . . . | 1931 | 14 | N | 32.0 | 41.8 | 30 8 |
| Woodman and Underwood . | 1929 | 1 | Complete | 26.3 | 35 5 | 35 0 |
| idem . . . | 1930 | 1 | N. | (1) 64 7 | (1) 71.3 | 10 2 |
| Woodmen, Norman and French | 1930 | 1 | Complete | 36 0 | 51.4 | 43 0 |
| Greenhill . . . . . . . . . . | 1930 | 4 | — | — | 48.1 | — |
| idem . . . . . . . . . . | 1933 | 4 | N + P | 38.5 | 53.6 | 39 |
| idem . . . . . . . . . . | 1934 | 9 | N. | 41.8 | 55.8 | 33 |
| idem . . . . . . . . . . | 1935 | 7 | N. | 42.6 | 55.1 | 29 [illegible] |
| Gardner. . . . . . . . . . . | 1931-4 | 1 | N. | 50.2 | 57.3 | 14 3 |

(1) Includes the winter growth. Manured and unmanured plots dressed with dung in the previous autumn.

The following table by E. J. ROBERTS (24), indicates the yield in dry matter, obtained in different trials in which the plots were cut every 4 or 5 weeks and the influence of fertilizer applications on yield.

As has been pointed out, nitrogenous fertilizers hardly affect directly the chemical composition of the herbage. Taking the average of 25 samples, GARDNER [cited in (24)] obtained the following values for crude protein:

| | |
|---|---|
| Grasses (no fertilizer) | 17.3 per cent. |
| ,, (nitrogenous fertilizer) | 18.3 ,, |
| Legumes (no fertilizer) | 26.4 ,, |
| ,, (nitrogenous fertilizer) | 26.9 ,, |

In an experiment carried out by WOODMAN, NORMAN and FRENCH (9) the dry matter of herbage cut monthly showed the following values (1930):

| | No fertilizer | Complete |
|---|---|---|
| Crude protein | 19.16 per cent. | 19.35 per cent. |
| Fibre | 20.67 ,, | 21.20 ,, |
| Ether extract | 3.99 ,, | 4.14 ,, |
| N-free extractives | 47.79 ,, | 46.27 ,, |
| CaO | 1.41 ,, | 1.31 ,, |
| $P_2O_5$ | 1.07 ,, | 1.07 ,, |

In general, it seems that local conditions, rainfall, type and fertility of the soil play a fairly important part in the action of fertilizers and particularly of nitrogenous fertilizers, the influence of which is especially appreciable in the periods when water is not a limiting factor in yield, that is, in spring and autumn. It seems, therefore, that it would be an advantage to increase the dose of nitrogen at this time, particularly in spring rather than spread it uniformly over the whole year. With a favourable temperature, nitrogen accelerates the growth of the grass in spring and prolongs it in autumn. Some English farmers, with a view to spacing out vegetation in the differrent plots and thus have as regular a product as possible at the time of cutting, vary the dose and time of application of the nitrogenous fertilizer. The question may be raised as to whether this practice is entirely justified; fertilizers only constitute one of the factors in growth and by not utilizing to a maximum in spring, the maximum possible yield cannot be obtained, as in some plots, full advantage is not taken of the other factors favourable to growth, in particular, water. If, at a given moment the herbage production exceeds the capacity of the drier, some other way of utilizing it should be adopted, for example, ensilage.

*Influence of weather.* — Weather conditions and especially rainfall have an important influence on yield as has been proved by the experiments of WOODMAN and others. The yield is proportional to the amount of rainfall and its distribution over the year. The greater or lesser effect of manures depends on moisture conditions. E. J. ROBERTS (24) cites the irrigation and manurial trials carried out by GREENHILL which show that productivity depends

essentially on the supply of water and nitrogen. On the other hand, too dry weather checks growth and accelerates the lignification of the herbage. WOODMAN observed that in a dry year, the grass contained less phosphoric acid than in a wet year and that the lime-phosphoric acid ratio was also modified.

Seasonal variations in growth. — Growth varies during the different months of the good season under the influence of different factors, particularly water and temperature.

With monthly cuts, WOODMAN noted the following monthly percentages in total production: April: 8.4 per cent.; May; 31.2; June: 22.5; July 8.8, August. 16.6, September: 13.5.

Owing to the impossibility of adapting the capacity of the drier to such variations, several growers, during the high production period, ensile part of the herbage. It is often necessary, however, to dry herbage less rich than during the rest of the season, or even what the English call super-hay, a better quality hay.

Influence of botanical composition. — The crude protein content and the nutritive value of very young grass are, in their ensemble, independent of the botanical composition of the sward. The latter, however, is no longer immaterial when the interval between cuttings becomes longer and when the presence or absence of a good proportion of leguminous species is appreciable.

The yield, earliness, curve of growth depend on the species and the strain. There are as many factors which have to be taken into account, as will be seen, in the case of temporary pasture or leys.

## Temporary pasture

STAPLEDON (27) called attention to the advantages of leys as regards artificial drying. The importance of their yields, the quality of the product—mention has already been made of the leaves-stem ratio, as compared with that of permanent pasture—the possibility of taking into account, according to the end in view, the different properties of species and strains, their rate of growth, content in dry matter and degree of resistance to frequent cutting, give them a special position.

Artificial drying only constitutes one mode of exploiting temporary pasture and here it is only necessary to examine the different aspects of the question.

Whatever the aim followed, the ley should only contain what it is intended to contain. In view of the methods of exploitation for artificial druing, it is very difficult to maintain the original flora over a period of 4 to 6 years, some species being bound to suffer. It is often preferable to keep to short leys (1-3 years). On the other hand, for a suitable distribution of seasonal production, it will be necessary to lay out different leys, each having a special purpose, its own mixture and managed to produce herbage at the period when required.

The dry matter content of grass is in inverse proportion to the quantity leafage during vigorous growth; when the leaves mature and the flowering stems begin to make their appearance, the dry matter increases. The dry matter

content is generally below the average with frequent cutting. STAPLEDON (25) gives the following figures for percentage dry matter on the basis of an average of seven pasture cuts:

| | | | |
|---|---|---|---|
| Fine-leaved red fescue | 28.9 | Crested dogstail | 25.3 |
| Timothy | 28.4 | Tall fescue | 24.3 |
| Meadow foxtail | 27.6 | Cocksfoot | 23.9 |
| Meadow fescue | 26.9 | Perennial ryegrass | 23.2 |
| Bent | 26.5 | Red clover | 23.2 |
| Italian ryegrass | 21.3 | | |

The lower yielding grasses tend to have higher dry-matter contents. Here the importance of strain is significant. The figure for timothy, for example was obtained on high yielding and leafy hay, and pasture hay timothy strains, and not upon the ordinary and stemmy commercial timothy. At every cut and at every date, the timothy gave a higher dry matter content than the ryegrass or cocksfoot, sometimes as much as 8 per cent. higher than either of the others.

Growth form and growability are more important than dry matter. 'To get high yields from 5 cuts a year, it is necessary to have strains that will grow quickly after each cut. The hay and not too-leafy strains will have much higher annual yields—as long as they stand up to the treatment—than the excessively pasture strains, although only the latter will stand frequent cutting year after year. The only sensible compromise would be to establish leys of short duration and to use the leafy hay strains of the plant breeder. These represent the compromise between the ultra-persistent leafy and the quick-growing stemmy strains.' STAPLEDON advocates:

| | | |
|---|---|---|
| Jenkin's hay perennial ryegrass | S. | 24 |
| ,, hay timothy | S. | 51 |
| Stapledon's own dense hay cocksfoot | S. | 145 |
| ,, ,, 'mop' cocksfoot | S. | 143 |

The management of leys is very important; they longer they have to last, the more important good management. Too deep a cut, especially at the beginning of the year, is very detrimental, particularly to cocksfoot and timothy.

STAPLEDON considers that 5 cuts are excessive for long leys, as also for permanent pasture. Allowing the grass to grow to a suitable length at least once during the year at any period between May and October, is of considerable assistance to root development.

The principle should be the following: if it is desired to take grass for drying from a certain plot, at a determined period, this plot at some other period must be left untouched to enable vigorous growth and consequently, the development of vigorous roots; hence the necessity of grouping the species according to the different mixtures for different plots. For example, to have an early heavy yield of cocksfoot in spring, the crop has to be allowed to grow freely in July-August of the previous year and only mown later.

**Legumes and different forage crops**

Lucerne. — The artificial drying of lucerne has become a regular industrial operation as lucerne meal has a regular and assured market as feedstuff.

In view of its high content in albumin and mineral matter and high yields, lucerne merits special attention. With artificial drying, there is no loss in leafage as is often the case with natural drying.

Type of management followed affects the quality of the forage produced and the duration of the lucern-fields. As with grass, the crude protein content in the dry matter increases with the number of cuts. Taking the average of trials over several years, HANSEN, Bendeleben (Kyffhauser), (31) indicates the following average values.

| | | | | |
|---|---|---|---|---|
| With one cut per annum | 12 | per cent. | crude | protein |
| » two cuts per annum | 13-14 | ,, | ,, | ,, |
| » three cuts per annum | 20-21 | ,, | ,, | ,, |
| » four cuts per annum | 23-24 | ,, | ,, | ,, |
| » five cuts per annum | 24 | ,, | ,, | ,, |
| » six to seven cuts per annum | 25 | ,, | ,, | ,, |

Inversely, as the lucerne develops, the fibre content increases. The N-free extractives increase up to the moment when the plant becomes full grown, to subsequently decrease when flowering begins. DAMSEAUX (32) cites the following figures given by RITTHAUSEN: 100 parts tedded lucerne contain

| | April 23 | May 22 | July 3 |
|---|---|---|---|
| Water | 16 7 | 16.7 | 16.7 |
| Protein substances | 28 7 | 21.9 | 14.8 |
| N-free extractives | 27 7 | 29.1 | 20.9 |
| Fibre | 18.3 | 22.6 | 40.4 |
| Ash | 8.6 | 9.7 | 7.2 |

How does lucerne stand up to repeated cutting? It has been found that with favourable soil and climatic conditions with also the possibility of irrigation facilities, lucerne supports frequent cutting, while under colder, too moist or too dry conditions, this system is harmful; the yield falls and the lucern-field becomes overgrown with grass. According to KLAPP (33), lucerne should, like all perennial plants, be allowed a period of rest sufficient to accumulate food reserves. From the experiments he cites, the following data have been taken:

(*a*) *Experiments at Poppelsdorf:*

| | | | | | |
|---|---|---|---|---|---|
| 3 annual cuts | 33.4 | per cent. | grass | in the | field |
| 4 ,, ,, | 58.2 | ,, | ,, | | ,, |

(*b*) *Various trials in Thuringia:*

| | | | |
|---|---|---|---|
| 1-2 cuts per annum (seed production) | 20.5 | per cent. | grass |
| 3 ,, ,, | 24.0 | ,, | ,, |
| 5-7 ,, ,, | 56.0 | ,, | ,, |

The more frequent the cuts, the more the lucern-field becomes overrun with grass. Shade (when the lucerne is dried on desiccators, for example) acts in the same way.

It is possible, however, to cut 3 or 4 times without damaging the lucern-field. In explanation, KLAPP gives the following example. A lucern-field is divided into two parts; part A is cut June 10, July 20, August 20 and September 15; the other half, B, is cut May 15, June 25, August 1 and September 25. Taking the lucerne as beginning to grow on April 1, the interval between cuttings or duration of growth periods would be

A · 71 – 40 – 31 – 26 days
B · 45 – 31 – 47 – 55 days

What is the result ? Part A becomes overgrown with grass, winters badly and in the following year gives 25 35 per cent. less hay than B which was not contaminated with grass and went through the winter successfully. Why ? In part A the possibility of accumulating food reserves was checked, that is to say that in the autumn, the interval between cuttings was more and more reduced, while in B, cuttings were arranged according to growth requirements and time of year. In summer, no disadvantage is incurred if a cutting is made 4 weeks after the previous one. In autumn, the contrary is true. In a grass overrun lucern-field, KLAPP left in one case, an interval of 76 days before the last cutting and, in another, an interval of 31 days. Grass cover decreased 20 per cent. in the first plot and increased 63 per cent. in the other.

To sum up, to make 4 cuts per annum in a lucern-field without risk or reduction in later yields, the decisive factor is the length of interval between the last and the penultimate cut and between this and the antipenultimate. These intervals should never be less than 40-50 days, even if for this reason, the last cut has to be made in October. A late cutting is only harmful when the previous interval is too short (less than 5-6 weeks).

## Different forage crops

The chief difficulty regarding other forage crops lies, not in the methods of production or cultivation, but in their regular distribution throughout the drying season. It is necessary, in fact, to supply the drier with sufficient quantities of green forage and to spread them over as long a period as possible, a condition indispensable for economic and continuous working. These forages should also, have a nutritive value and albumin content so as to justify the expense of drying.

The combinations responding to these requirements are numerous and may vary according to regional and local conditions. The following is a brief review given as an example, of the project of crop distribution proposed by SESSOUS and PIELEN (34) for regions of good soils and suitable for a large drier which would work for a determined district by means of crop contracts. SESSOUS and PIELEN eliminate in their calculations, plants with a poor albumin content such as maize, sunflower, buckwheat, etc.

End March-beginning April: early rape, followed by mid-season rape. · Sown August 20-30 and first week of September in temperate position. The average yields are from 15 to 25 tons per hectare SESSOUS and PIELEN obtained up 47.5 tons (at flowering) with 5910 kg. dry matter and a crude protein content of 18.42 per cent. (1089 kg. crude protein per ha.).

Forage colza: sown 10 days before rape and harvested 8 days after same. Average yield in green matter is 25,000 kg. and may attain 40,000 kg. with 6,000 kg. dry matter and 1,000 kg. crude protein per ha.

Rapko: (cross between colza and an English variety of cabbage): harvested end of April. The plant is more rich in leafage than the two previously mentioned and gives equal yields. Only suitable for good soil and moderate climate.

End April-beginning May: Forage rye.

Beginning May-mid May: Vetch-rye mixture. The rate of growth of the two plants in spring does not entirely correspond. Time of cutting is decided according to the stage of development of the rye or the vetch,depending on which predominates in the mixture. A mixture with vetch predominating has a very high crude protein content and is to be preferred for artificial drying. In wheat lands, wheat can replace rye in the mixture, its rate of growth agreeing better with that of vetch. Taking an average of several years, SESSOUS and PIELEN obtained per hectare, with a mixture of 100 kg. wheat and 80 kg. hairy vetch, over 30,000 kg. greenstuff containing over 4,000 kg. dry matter and 900 kg. crude protein. The crude protein content of the dry matter amounted to 20-22 per cent.

Mid May: Landsberg mixture (crimson clover, Italian ryegrass, sand vetch). By modifying the proportions of the mixture, it can be adopted to widely differing conditions. In Germany, it is usually employed at the rate of 20 kg. crimson clover, 20 kg. Italian ryegrass and 30 kg. sand vetch. The Landsberg mixture gives high and certain yields. With early sowing and taking into account an autumn cutting, SESSOUS and PIELEN often obtained per ha. 50,000 kg. green matter, with 7500 kg. dry matter and 1600 to 1700 kg. crude protein. The autumn cut frequently gave 15,000 kg. green forage containing 25-28 per cent. crude protein (as against 14.16 per cent. in spring) and may be used to produce a forage meal. The protein content is influenced considerably by the proportion of the different constituents and especially that of vetch. For artificial drying, up to 50 kg. of vetch may be used in the mixture.

After mid May when the last winter forage is harvested, a start can be made with young grass. After the grass, first lucerne cutting, then red clover.

During the summer months, besides the second cutting of lucerne and red clover or other legumes, comes a series of spring plants and mixtures.

End June-beginning July: vetch-oats mixture which can follow after a winter catch crop.

Mid July: second cutting of Sudan grass. Practically at the same time is the first cutting of forage mallow, of which a second cutting can be made towards mid August and, in a favourable year, still a third later on. Yield in weight and crude protein of the forage mallow are very high. Figures of

20,000 to 40,000 kg. and over are cited. With early sowing, SESSOUS and PIELEN often obtained over 55,000 kg. per ha., containing over 7,000 kg. dry matter and 1,550 kg. crude protein. The content of the latter varies between 18 and 24 per cent. according to stage of development. The green forage is not always willingly accepted by stock. In natural drying much foliage is lost and there only remains a woody fodder. Artificial drying would be very suitable.

Field pea mixture (Peluschken) with horse beans, sunflower or maize as supplement. — Can follow after winter forage or on stubble after a early harvest. According to sowing period and the composition of the mixture, yield per ha. amounts to 15,000 to 30,000 kg. green forage, rich in albumin. This gives with the third or fourth cutting of lucerne, the aftermath and eventually the autumn cutting of the Landsberg mixture, the necessary forage for drying in September-October.

At the beginning of October, the beet leaves and tops are available. Subsequently, the last forage for drying is marrow cabbage, which, owing to its resistance to cold, can be harvested up to mid December. According to whether the marrow cabbage is grown as the main crop or as a catch crop, the yield varies between 25,000 and 60,000 kg. and sometimes up to 80,000 kg. per ha., with the highest yields in albumin per unit area. The marrow cabbage is generally used as a green forage but can also be dried artificially.

With light soils, more or less considerable modifications would have to be made in this system, according to the fertility of the soil and annual rainfall distribution. Some plants would not be suitable and could only be replaced by serradella and sweet lupin.

## III.

## ARTIFICIAL DRYING AND OTHER METHODS OF CONSERVING GREEN FORAGE

A. HANCK, Agr. Engin., Gx.

The first results obtained from the artificial drying of young grass were so promising that many technicians saw in this process a radical change in farming methods. From there, by a natural tendency, there has been a veering over to an exaggerated belittling of the other methods of conserving forage, hay-making and ensilage. An examination of these different processes may be of interest, With a fuller knowledge of the relative advantages of artificial drying, a more balanced conception of the place and relative importance of each of the methods in question will be gained.

The following points will be discussed successively: Variations in production and system of working; losses incurred in hay-making, ensilage and artificially drying; fodders obtained and the requirements of animal production. No attempt, however, will be made regarding the question of cost, which has to be studied in each individual case.

## Variations in production and system of working

Forage production is not uniform, it varies according to seasonal and especially moisture and temperature conditions. In May-June, grass productivity is at a maximum, and at a minimum in April and July, to flourish again in August and September (WOODMAN). From one extreme to another, variations are in the order of 1 to 4. It is evidently impossible to adapt drying plants to these variations. The consequences of these variations may be attenuated by spring applications of nitrogenous fertilizers so as to stimulate the early growth of the grass, but the action of the fertilizer depends entirely on climatic conditions; the working day may be prolonged during the period of active growth and drying effected both day and night, or partially wilted grass may be dried on the ground, the drier can be closed down during the months of minimum growth (July, beginning of August). Whatever the method employed, the result will only be partial or aleatory. There will always be a period when the growth rate of the herbage will exceed the capacity of the drier or a period when this capacity will be too large in comparison with the forage production. This latter alternative, disastrous as regards cost, should be avoided and there only remains the former. During the periods of vigorous growth, therefore, either grass with a lower nutritive value owing to late cutting, has to be treated which would not justify the cost of artificial drying, or else part of the crop has to be made into hay or silage This system in fact, is the one frequently followed. At the Walker-Gordon Dairies, New Jersey, during the heavy growth period, the excess grass is ensiled, the same is the case at the experiment station farm at Jealott's Hill. In this instance, artificial drying and ensilage (or eventually hay-making) appear not as concurrent but rather as complemental methods.

## Losses incurred in hay-making, ensilage and artificial drying

This point merits a more detailed study. Artificial drying is a costly operation and it is not the latter which gives a special nutritive value to the product; it simply conserves the rich forage obtained. Besides the direct expenses for artificial drying, hay-making or ensilage, there are the invisible expenses resulting from losses during treatment and conservation. These increase costs and the concentrated product desired is not obtained.

H a y - m a k i n g . — In hay production, quality is generally sacrificed to quantity and the vegetation is at too advanced a stage for the crop to be anything but a coarse foodstuff. To produce a better quality hay, the crop should be harvested much earlier, but then there is the difficulty of climatic conditions which make the result aleatory. Young herbage, moreover, is more difficult to dry and its manipulation leads to higher losses.

Heavy losses are incurred in hay-making in the normal period. There are five main causes: (*a*) losses through respiration of the cut grass; (*b*) losses due to leaching by rains; (*c*) mechanical losses during manipulation of the dry hay (chiefly leaves); (*d*) losses through fermentation of the stored hay; (*e*) losses due to decrease in digestibility.

TABLE 5. — *Percentage losses due to hay-making, based on nutrients in the fresh crop* [WIEGNER (35)].

| No of trials | Treatment and weather | Dry matter | Digestible crude protein | Digestible true protein | Starch equivalent |
|---|---|---|---|---|---|
| 1 | No mechanical loss No rain . . . . | 8 7 | 16 5 | 13 8 | 22 6 |
| 2 | Mechanical losses No rain . . . . . | 14 7 | 22 5 | 32 7 | 38 6 |
| 7 | Rain . . . . . . . . . . . . . . . | 23 7 | 34 7 | 40 4 | 49 7 |
| *3* | 1-2 showers (1-20 mm) . . . . . | *18 9* | *22 9* | *27 8* | *43 6* |
| *4* | 5-6 showers (12-63 mm) . . . . | *27 1* | *38 3* | *49 8* | *54 2* |
| 10 | Average of all trials . . . . . . . | 20 3 | 30 4 | 36 2 | 44 7 |

In Switzerland where the most complete studies have been made on losses in hay-making, WIEGNER obtained the following results, taking the average of 10 trials spread over the period from 1921 to 1930. The forage utilized contained 30 to 71 per cent. grasses and 70 to 29 per cent. legumes. The figures comprise the losses due to fermentation during storage in the hay-loft. (Table 5).

Total losses, therefore, would represent 10 to 30 per cent dry matter, 15 to 35 per cent. digestible nutrients and 25 to 50 per cent. starch equivalent. Under the most favourable weather conditions, losses in general would be 40 per cent. starch equivalent and 30-35 per cent. digestible true albumin.

When hay-making under good weather conditions, the different loss factors intervene to the following extent.

TABLE 6. — *Losses incurred in hay-making in good weather.* [WIEGNER (35)]

| | Dry matter % | Digestible dry matter % | Starch equivalent % |
|---|---|---|---|
| Respiration . . . . . . . . . . . . | Up to 10 | 5-15 | 5 15 |
| Mechanical losses . . . . . . . . . . . . | 5-10 | 5-10 | 5-10 |
| Fermentation in stack . . . . . . . . . | 5-10 | 5-10 | 5-10 |
| Increased energy needed for digestion . . . . | — | — | 10-15 |
| Total . . . | 10-30 | 15-35 | 25-50 |

The loss in nutritive value exceeds that in dry matter, the part lost being the most digestible of the plant.

At Jealott's Hill, S. J. WATSON (18,38) obtained figures entirely comparable with those of WIEGNER, with losses varying between 10 and 37 per cent. for dry matter, 23 and 43 per cent. for starch equivalent and 17 and 54 per cent. for protein equivalent.

TABLE 7. — *Coefficients of digestibility of green crop, hay and of the material lost in hay-making* [WIEGNER (35)].

| | Organic matter % | True protein % | Fibre % | N-free extractive % |
|---|---|---|---|---|
| Fresh grass | 66 | 70 | 58 | 72 |
| Hay | 61 | 58 | 57 | 63 |
| Material lost in hay-making | 97 | 99 | 72 | 105 |

Hay-making with different types of driers makes drying more independent of weather conditions. Thus mechanical losses and losses due to leaching by rain are considerably reduced. When conditions are favourable, the benefit obtained with the use of driers is minimum and it may even be an advantage to ted the grass on the ground, drying being quicker. On the other hand, when weather conditions are bad, the losses do not exceed those observed in hay-making on the ground in good weather. On an average, losses are reduced from 5 to 10 per cent. as compared with natural hay-making, the highest figure being obtained during bad weather.

TABLE 8. — *Results of 79 harvesting experiments and 24 nutrition tests* [WIEGNER (36)].

| Weather conditions | Drying | Loss in | |
|---|---|---|---|
| | | Digestible protein | Starch equivalent |
| Very good | in drier | 1/5 | 1/3 |
| Good to very bad | *id.* | 1/3 | 2/5 |
| Very good | in field | 1/3 | 2/5 |
| Bad | *id* | 1/2 | 1/2 |
| Very bad | *id.* | 2/3 | 2/3 |

E n s i l a g e. — Ensiled herbage undergoes losses through drainage, respiration, fermentation, etc. The two principles at the basis of proper ensilage are the complete as possible suppression of air and the stimulation of lactic fermentation. The use of a silo not only helps to protect the product from air, but also enables a better compression of the mass to be obtained. It is difficult to press down mature herbage with a high stem percentage and consequently, losses due to respiration are relatively high. Short grass, however, can be compressed too compactly and anaerobic fermentation takes place.

Ensilage at a high temperature (up to 50°C and over) gives a mild and palatable product, but in which the losses may easily be as high as those incurred in haymaking as can be seen, for example, from the following table.

TABLE 9. — *Losses in nutrients incurred in hay-making and ensilage (herbage cut the same day)* [WIEGNER (36)].

| | Hay | Sweet silage |
|---|---|---|
| Dry matter | 14 % | 22 % |
| Digestible crude | 24 % | 46 % |
| Digestible true protein | 40 % | 69 % |
| Starch equivalent | 41 % | 43 % |

The same as for hay, the coefficients of digestibility of sweet silage are inferior to those of the basic product. The products lost are completely digestible.

TABLE 10. — *Coefficients of digestibility of grass, hay and sweet silage (herbage cut the same day)* [WIEGNER (36)].

| | Organic matter % | True protein % | Fibre % | N-free extractive % |
|---|---|---|---|---|
| Grass | 64 | 70 | 58 | 71 |
| Hay | 59 | 58 | 57 | 63 |
| Sweet silage | 57 | 38 | 60 | 60 |
| Material lost in sweet silage | 91 | 100 | 49 | 96 |

When weather conditions are favourable, appreciably more digestible crude protein and digestible true protein are obtained in hay-making than from the warm-fermentation ensilage process (sweet silage).

TABLE 11. — *Composition of dry fodder (hay) obtained in good weather as compared with sweet silage (equal 100)* [WIEGNER (37)].

| | Trials at Zurich (Experiment silo) (1) | | Trial at Liebefeld (Farm silo) (2) | |
|---|---|---|---|---|
| | Silage | Hay | Silage | Hay |
| Dry matter | 100 | 109 | 100 | 116 |
| Digestible dry matter | 100 | 113 | 100 | 110 |
| Digestible crude protein | 100 | 142 | 100 | 92 |
| Digestible true protein | 100 | 195 | 100 | 144 |
| Starch equivalent | 100 | 101 | 100 | 98 |

(1) Mowing the same day. — (2) Mowing for ensilage 2 to 5 weeks before cutting for hay.

In the cold-fermentation process, the temperature is not allowed to go beyond 25-26° C by means of water-tight silos and a very close compaction of the mass. This process is costly and difficult; a more simple method is ensilage at a moderate temperature, maintained between 26 and 38° C. The temperature is controlled by suitable compression of the mass, regulating the thickness of the successive layers and the rapidity in filling the silo. The essential secret of successful silage is the establishment of a vigorous lactic fermentation which can be stimulated, for example, by the addition of molasses. This addition is particularly advantageous for forage rich in protein.

The A. I. V. process obtains the immediate acidification of the mass, without having to wait for lactic fermentation. The addition of dilute hydrochloric and sulphuric acid proposed by VIRTANEN enables the *p*H to be regulated between 3 and 4 and reduces losses considerably.

The following table [from PAGE (19)] gives the losses observed in low temperature silage and A. I. V. silage:

TABLE 12. — *Losses in low temperature silage and A. I. V. silage* (19).

| Experimenters | Process | Losses in dry matter reported in the different experiments |
|---|---|---|
| Wiegner | A I V | 8 08, 3 15; 7.64, 22 74 |
| Poijarvi | A I V | 10 8 |
| Spilo | A I V | 3 4 |
| Drew | A I V | 12 6 |
| ,, | low temperature | 17 3 |
| Boyle | A I A. | 7 3 |
| ,, | low temperature | 10 6 |
| S J. Watson | A. I V. | 8 3; 24 0; 21 6, 15 7; 24 0; 22.1; 18 1 |
| | low temperature | 15 1; 28 9; 21.1 |
| | low temperature (with molasses) | 15 2; 22 9; 24 0; 23 9; 24.8; 12.5 |

These processes, therefore, reduce losses to 20 per cent. and even less. At the same time, the chemical composition and digestibility of the dry matter in the herbage conserved in this way differs little from that of the material used for silage.

Artificial drying. — With a well-designed drier, losses due to artificial drying are small. As the material is taken to the drier immediately after cutting, there is no loss through respiration; mechanical losses in the field are obviated. There is no fermentation loss as the final product is adequately dried and stored. There may be some mechanical loss at the drier but this can be reduced to a minimum by collecting all the powdered material.

Few changes take place during drying and if the herbage is removed from the action of the gas as soon as dry, the composition and digestibility are not affected.

The following table gives, as an example, the results of a drying experiment carried out at Jealott's Hill in 1934:

TABLE 13. — *Experiment on the artificial drying of grass* (18).

| Load No | Fresh grass Weight lb | Dry matter % | Dry matter lb | Artificially dried grass Weight lb | Dry matter % | Dry matter lb | Percentage recovery |
|---|---|---|---|---|---|---|---|
| 1 . . . . . . . . . . . . | 504 | 22 6 | 113 7 | 105 4 | 89 04 | 93 8 | 82 5 |
| 2 . . . . . . . . . . . | 616 | 21 0 | 129 4 | 125 4 | 89 13 | 111 8 | 86 4 |
| 3 . . . . . . . . . . . . | 616 | 20 1 | 123 8 | 114 2 | 90 80 | 103 7 | 83 8 |
| 4 . . . . . . . . . . . | 651 | 20 7 | 134 8 | 154 3 | 81 00 | 125 0 | 92 7 |
| 5 . . . . . . . . . . . . | 606 | 22 7 | 137 6 | 157 9 | 80 45 | 128 6 | 93 5 |

The drier not being completely warmed up, the first three loads were not completely dried and had to be put through the drier a second time. This double drying reduced the moisture content of the final product and increased the loss in dry matter which rose to 15 9 per cent. In the latter two loads, however, the loss in dry matter only amounted to 6.9 per cent.

The following table compares the composition and digestibility of fresh grass and artificially dried grass.

TABLE 14. — *Composition and digestibility of fresh grass and artificially dried grass. Jealott's Hill, 1934* (18).

| | Fresh grass | | Artificially dried grass | | Loss in dried grass | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | Twice dried | | Once dried | |
| | Composition % of dry matter | Digestibility % | Composition % of dry matter | Digestibility % | Crude % | Digestible % | Crude % | Digestible % |
| Ether extract . . . | 3 41 | 45 3 | 3 99 | 68 6 | 1 4 | + 49 9 | + 0 9 | + 65 8 |
| Fibre . . . . . . . | 22 81 | 79 2 | 23 60 | 80 5 | 12 8 | 11 4 | 3 7 | 2 1 |
| Crude protein . . . | 15 93 | 65 8 | 15 45 | 65 6 | 18 2 | 18 4 | 9 7 | 9.9 |
| Ash . . . . . . . | 9 68 | — | 8 98 | — | 21 8 | — | 13 6 | — |
| N-free extractives . | 48 17 | 73 8 | 47 98 | 75 8 | 16 0 | 13 7 | 7 2 | 4 7 |

The composition and digestibility of fresh grass and artificially dried grass are in good agreement. S. J. WATSON estimates that the losses due to artificial drying may be kept at 5-10 per cent. of dry matter and losses in starch equivalent and protein equivalent at about 5 per cent. of these values for the fresh grass.

## Minor constituents and method of conservation

H a y - m a k i n g. — Information on this question is limited. According to CRASEMAN—cited by WATSON (18)—the loss in mineral matter averages 7 per cent. in good weather and 36 per cent. in bad weather. In the drier, los-

ses are from 17 to 22 per cent. and are but slightly affected by weather conditions. In good and had weather, the losses of calcium were 10 and 33 per cent. respectively, for magnesium 15 and 36 per cent., potash 7 and 48 per cent., and phosphorus 20 and 25 per cent. The greater part of the lecithin is lost in hay-making.

Hay usually contains very little carotene and under adverse conditions, loss may even be complete. If account is taken of the relative richness of grass, these losses, even without carrying out direct experiments, may be attributed to hay-making.

The content of grass in vitamin B—which is low—does not seem to be affected, but may be leached by rain; vitamin C is destroyed. On the other hand, irradiation increases the vitamin D potency of the hay and its antirachitic value.

Ensilage. — The carotene contained in grass suffers little loss in a well prepared silage, especially using the A. I. V. method.

Loss is only high if the temperature is allowed to go too high or if the silage is not protected from air contact.

Losses in vitamin C are very high and sometimes complete, except with the A. I. V. process when it is possible to recuperate about half in the silage.

Vitamins B and D are affected but little in ensilage.

Artificial drying. — Artificial drying causes little loss in carotene. Tests made at Jealott's Hill gave the following results:

TABLE 15. — *Carotene content of grass before and after artificial drying* (18).

| Date | carotene in mg per 100 g of dry matter | |
|---|---|---|
| | fresh grass | dried grass |
| October 29, 1931 | 42 2 | 40 4 |
| November 3, 1931 | 48 4 | 43 9 |
| November 11, 1931 | 56.2 | 47 5 |

Vitamins B and D, generally found to a small extent in grass, are not affected by artificial drying. Vitamin C is destroyed. The mineral matter does not seem to undergo any change.

Partial drying in the open air before artificial drying. — With a view to reducing the cost of artificial drying and increasing output of the apparatus, the grass is sometimes left to wilt and partially dry on the field. Experiments of GREENHILL at Jealott's Hill have shown that after 54 hours drying under favourable conditions, the grass had not suffered any appreciable loss in dry matter, nor any change in the dry matter. Taking the average of different treatments, the loss in carotene did not exceed 22 per cent (19).

### Fodders obtained and the requirements of animal production

The nutritive value and utilization of young artificially grass being treated further on in a special study, (p. 251), we will only examine this point briefly. While hay generally is only a coarse fodder, young dried grass is considered both as a concentrate and as a green forage. As a concentrate, it has a high nutrient content; as a green forage, it is rich in carotene, vitamins and minerals. In the winter feeding of stock, it holds a place which cannot be contested by any other foodstuff. It cannot, however, by itself constitute the entire ration and has to be supplemented by roughage, including hay. It may also be pointed out that artificially dried young grass has found a regular outlet on the market for stock-feed concentrates. Owing to its easy handling and good conservation, it lends itself to transport and trade and constitutes a practical means of compensating forage shortage in one region by excess production in another.

Silage, whatever the method employed and the quality of the product, cannot form the entire ration either. The capacity of the animals to absorb this product is limited; beyond this limit, the ration has to be supplemented by other forages. Care has to be taken in the use of silage prepared with the addition of mineral acids (A. I. V.). It is not known as yet what effect these silages would have on the health of the stock in the long run and even on breeding conditions. Lastly, silage is not suitable for milch cows, the milk of which is used in the preparation of hard cheeses.

These observations—which could with the necessary variants, be applied to other forage crops dried artificially - show that hay-making, ensilage and artificial drying each has its own province and use. In the working system as in animal nutrition, the processes and the products are more or less complementary. As regards losses, artificial drying gives, with almost no loss, a concentrated product, hay-making furnishes a relatively coarse, bulky mass sometimes with enormous losses, silage, according to the method employed, occupies practically a intermediary position.

## IV

## TECHNIQUE OF ARTIFICIAL DRYING OF GREEN FORAGE

H. J. Hopfen

### General

The first attempts at artificial drying of green forage were made in the United States before the world war of 1914-18, but it was only after this war that practical results were obtained. During this war the necessity of conserving perishable foodstuffs led to a considerable development in the technique of artificial drying, especially in Germany, subsequently, however, interest dropped as conditions returned to normal. Some years later this question received a new impulse from another quarter, the fertilizer industry which, in England,

had turned its attention to the high nutritive value of young grass in well fertilized pastures and had suggested research work on the subject, during which the importance of artificial drying was recognized This question was also studied with success in other countries: Denmark, Sweden, Switzerland, etc In view of its importance, it has now come to the foreground The object of artificial drying which previously consisted rather in conserving masses of fodder to prevent it spoiling, is now primarily the production of high quality forage rich in protein, intended to substitute the concentrates, which, formerly had to be purchased, by products of equal nutritive value obtained on the farm itself.

To obtain a dry forage of high nutritive value, the following are necessary: (*a*) high quality raw material — (*b*) suitable preliminary treatment and preparation — (*c*) drying as rapid as possible These are the three conditions which frequently it is so difficult to combine, consequently, the farmer needs to have a real talent for organization

In order to obtain the best quality dried forage, the green forage must be cut when still young and taken to the drier without excessive delay. Consequently, a preliminary natural drying in the field with a view to reducing the moisture content of the herbage and therefore the heating expenses, can only be recommended if limited to a short period and under favourable weather conditions. In fact, a preliminary wilting of the herbage easily causes fairly considerable losses in nutrients and vitamins Moreover, it implies, in comparison with the immediate treatment (*a*) increased labour expense after mowing — (*b*) greater soiling of the herbage owing to the multiple handling — (*c*) in the case of many forage crops as, for example, vetches, the risk of rotting instead of wilting when the weather is warm and humid

The difficulties caused during the process of drying by herbage, partly rotted and partly wilted, sometimes increase the cost of drying more than in the case of having to use extra fuel in the drying of fresh forage

It is now possible, however, to effect another type of preliminary treatment to facilitate the subsequent process of drying by employing new special machines which are particularly suitable for the immediate romoval of the herbage in that they not only mow and load but at the same time prepare it to some extent by cutting it.

## I. — Mowing and transport of Herbage

In mowing, use has recently been made of the forage-harvesters (Fig. 1), developed from the English 'Cutlift'. While, however, the latter are not suitable for large farms and can only be used for mowing grass, the forage harvesters can be adapted in various ways and, therefore, can also be employed on medium-sized farms. The cutlift has, behind the cutter-bar, an inclined metal platform up which the grass is swept by rakes to subsequently be poured into an attached trailer. The rakes are actioned by two endless chains and extend far out towards the front above the cutter-bar, and thus can easily collect short herbage. On the other hand, the forage- harvester developed in the United States, takes up any type of green forage by means of a reel similar to that of harvesters,

The herbage is lifted by means of elevators made of rubber sheeting which are not effected by humidity. At the upper extremity of the elevator, the herbage passes through a chopper device, where it is cut up very fine, and from there to another elevator into the attached trailer (39).

In place of this chopper device with elevator, there are now to be found forage-cutter elevators which, similar to forage-cutter ensilers, chop the herbage and pass it into the trailer by means of a suction pipe, the upper jointed extremity of which can be changed in various directions. This latter device enables the chopped herbage to be distributed on the trailer mechanically without manual labour.

In its construction the mower-cutter resembles the small harvester-thresher, from which it has taken the cutter-bar, the frame, the reel and the elevator.

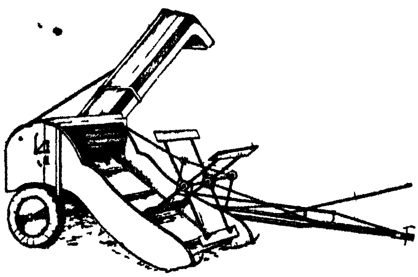


FIG. 1. — *Forage-harvester.*

The same as the harvester, the cutter-bar can be replaced by a collecting drum enabling the machine to harvest hay or straw for chopping, which considerably extends its utility.

For the forage-harvester to work efficiently, it is naturally necessary to have several trailers available at the same time in order to assure uninterrupted harvesting. As this is not always possible on small farms, an endeavour is now being made to harvest the herbage in such a way as to be able to carry out separately the mowing and the transport of the product to the farm.

To this end, a modification has been made in the construction of the binder so as to be able to employ it for harvesting the herbage. Experiments made have shown that such a machine can mow and bind green forage long 25 cm. and over, but not herbage of shorter length, which limits considerably its use. It should be noted, moreover, that bound herbage should be untied as it arrives at the farm, otherwise it becomes heated and spoils rapidly. The advantage of the system lies in a better distribution of the work, so that the loading and transport to the farm do not coincide with the mowing, consequently, it is not necessary to meet at the same time all motive power requirements.

As regards mowing, the best system would be to carry out this operation during the middle of the day and in the afternoon, a time when the plants contain less moisture.

The problem of transport to the drier is often more difficult to solve than the drying itself. It would be necessary to assure, within a certain radius of each drier of a fair size, a territory which would guarantee a sufficient inflow of

herbage, with no risk of there being any competition with other similar establishments. Delay in the transport of herbage or beet leaves, easily caused by difficulty in bringing them to the drier, leads to an inadequate utilization of the latter and sometimes annoying interruptions in its operation.

## 2. — Construction of driers for green forage

The question as to whether driers should be constructed arises chiefly in areas where there is a fairly regular and assured production of herbage over a long period without there being any drying establishment suitable or capable of being enlarged near at hand. The size of a drier generally depends on the maximum quantity of herbage to be dried over a given period.

In the sugar-beet growing regions, the sugar mills are especially indicated for artificial drying installations. Where the beet is not grown and where chiefly forage crops are cultivated, it becomes very difficult to establish driers as they would operate for too short a period, while with the drying of beet leaves as well there is the advntage of prolonging operation up to double the period (34).

In the regions where pasture predominates, it is less difficult to organize artificial drying. The pastures can furnish regularly a raw material of high nutritive value, all the more so in that an excess of herbage rich in protein is frequently available. As the farms with a long pasture period stall-feed their stock to a lesser extent, with a consequent smaller requirement in dry fodder, relatively small driers would suffice. In this respect, it should be noted that these farms use more or less elementary systems of drying, necessitating, it is true, smaller installation costs but, on the other hand, more fuel and manual labour, so that their working expenses are higher than those of driers which cost more to install but which operate more economically. Where driers are in constant operation, the most up-to-date and expensive systems will, in time, become the most economical, while where the drying season is short, the more or less primitive installations will be more suitable despite the working and manual labour expenses.

In constructing new driers, it should always be kept in mind that, as utilitarian buildings, they should be built not only in conformity with the requirements of a rational working system but also with a uniform configuration. Every endeavour should be made to maintain the industrial character of the driers in harmony with the rustic character of the surroundings, without detracting from one or the other. This difficult question can only be decided in each particular case. Driers should not be combined with other buildings in a closed courtyard in order to diminish the risk of spread of fire in the case of any outbreak. There should also be plenty of space about the drier so that the trailers or trucks have plenty of room for all transport and unloading operations.

## 3. — Drying process

This depends essentially on the action of three factors: (*a*) mechanical treatment of the raw material — (*b*) action of heated gas on the product to be dried — (*c*) speed and direction of the movement of these gases.

The mechaical treatment of the raw material is of considerable importance as regards the regularity and rapidity of the drying process by the fact that it subjects this raw material to a preliminary operation which renders it more adapted for rapid drying. For herbage, the best treatment is chopping which is now being carried out, as has been already said, in the field during the harvesting of the forage. On the other hand, chopping is not suitable in the case of beet leaves as they tend to become agglutinated in the drier. After having been collected in the usual way, the beet leaves should first be washed in the special apparatus employed, then shredded in the 'openers' (pairs of cogged rollers revolving inversely at different speeds) or else cut up by the 'universal grinder' (40) which works on the same lines as the ordinary meat-mincer. Before dividing the leaves, this apparatus presses them by means of a conical endless screw in order to remove the water remaining after washing. It has the advantage of cutting the leaves into regular, even fragments, but the disadvantage of consuming too much tensile force and above all that of not only eliminating by pressure the surplus water after washing but also part of the plant juices and with it a fairly high percentage of valuable nutrients and vitamins.

The drying process properly so called depends on the action of the hot gases and their rate of circulation through the material to be dried.

The temperature of the gases entering the drier varies, in the different systems employed, between 150° and 750°C., according to the moisture content of the herbage and also the speed and direction of the said circulation. The majority of the driers follow the principle of *one-way current*, according to which the material to be dried advances in the same direction as the hot gases, so that the active gases enter the apparatus at the same time as the fresh herbage. This process has this advantage. the temperature of the incoming gases can be very high without there being any risk of damaging the material to be dried, as the temperature of the latter cannot rise above 70°C. as long as it contains any moisture. It follows that, in rapid-operating driers, the temperature of the inlet gases can be allowed to go slightly above 700°C. without any danger

The case is different when the drier is constructed on the *inverse current* principle, in which the active gases encounter the raw material and dry it, *i. e.*, passing through the drier in the opposite sense to the flow of the product to be dried. In this case, great care must be taken to avoid overheating of the material at the end of drying, as it rapidly acquires the temperature of the hot gases when it no longer contains any more moisture The temperature of the incoming gases, therefore, should not exceed 150° C (41).

The heat is furnished almost exclusively by fuel gas, cooled by the addition of air to the required temperature for their entry into the drier. The cost of the fuel employed represents a large part of the total drying costs: in some cases, up to 50 per cent and even more. The furnace producing the hot gases, therefore, is a very important, though too often disregarded, part of the installation. The furnace should produce clean gas free from loose cinders. It should assure not only a rapid and precise regulating of the temperature and the quantity of hot gases, but also the maintenance of a temperature as even as possible within

the limits established, that is to say, be able to easily and adequately meet the various requirtments of the drier during operation (42).

Good heating can be obtained with the use of a small furnace with a mobile grate (see Fig. 2) which, while assuring the production of gas entirely free from smoke, an excellent regulating, facility of adaptation and regularity in operation, has the advantage of being automatically supplied with coal and cleared of the ash. The mobile grate, arrived at the end of its course, turns, drops into a slag container the residue of the fuel consumed and thus facilitates considerably the working of the drier with this automatic system. All these advantages show that, despite its high price, the mobile grate is to be preferred to that of other types for the drying of herbage.

Besides ordinary types of heating, the heating of driers by means of producer gas should be given greater attention wherever the energy produced serves not only as a source of heat but also but also for the working of the engines employed in the driers (for ventilation, etc.). In general, the motive force necessary for the latter is furnished by electric current; when, however, this is wanting or else if is desired to utilize mobile driers, the use of a gazogene or gas-producer should be taken into consideration The latter, which enables the heating to be regulated faultlessly, should be of a size in proportion to the requirements of both heating and motive power, those of the former being much greater than those of the latter.

At present, in most systems, the drying is effected by *direct* contact of the hot gases with the material to be dried. The processes in which the hot gases cede their heat to the latter *indirectly*, that is to say, through the intermediary of heated surfaces, are not so effective and are being used less and less.

## Different types of driers for green herbage

According to the technique employed in drying, there are several types of driers: tray driers, band driers, drum driers, pneumatic driers, etc. (43) (44).

### 1. — Tray drier

This is the simplest type of drier, usually composed of several compartments with perforated sheet iron at the bottom, through which the hot gases are driven by fans. The temperature of these gases should not exceed 120° C in order that the material spread on the sheet iron plates may not be heated much above 60° C., to the detriment of its nutrient content. This risk is not so great at the beginning of drying as at the end when the practically dry material easily attains the temperature of the hot gases. This is why, during drying, the material has to be turned by hand more and more frequently. For the herbage to dry evenly, it is very important that it should be in a loose layer and not allowed to form into lumps.

At the beginning of drying, the hot gases act effectively, *i. e.*, they remove a relatively large amount of water from the herbage; but, subsequently, with simple driers, this efficacity diminishes as drying advances and, at the end of the

operation is practically reduced to zero, owing to the fact that the hot gases become less and less able to remove the vapour from the said material and that, by transversing the kiln once only, they do not emerge saturated. This utilization of heat, poor, taken as a whole, naturally involves heavy fuel costs. Nevertheless, the simple tray drier has not lost its usefulness as it is suitable when a drier only has to be worked occasionally and with stoppages during operation. It is also suitable for the drying of products other than green forage and beet leaves, such as cossettes, cereals, potatoes, etc.

2. — TWO TRAY BATCH DRIER

It is natural for an endeavour to be made to increase the efficacity of tray driers by making the hot gases circulate through the herbage not once but several times. This can be managed by dividing the drying process into two phases: (*a*) preliminary drying of the moisture-containing forage — (*b*) final drying. This process is often worked with the inverse current system: the gases first pass through the half-dried material and then travel through the fresh herbage into the air. The two tray driers utilize the heat much more effectively than the simple tray driers, but require greater attention in the final drying stage in order to avoid losses in nutrients through overheating. On the other hand, there is not much saving in manual labour and their construction costs considerably more than that of simple tray driers, so that they are justified only if supply is adequate and operation regular. This system has been developed chiefly in England, where it is widely used first in the form of the Billingham drier, now no longer sold owing to prohibitive manufacturing costs, and the Curtis-Hatherop drier.

3. — MULTIPLE TRAY DRIERS

These driers are the result of the endeavours made to obtain a fuller utilization of the hot gases by means of several superimposed trays. Drying is effected by means of an inverse current of gas: the fresh herbage arrives first on the top tray, then, as drying progresses, it passes successively to the lower trays, while the hot gases travel upwards. The transmission of the material to be dried from one tray to the following is generally effected by means of shutter valves. As, however, these are not suitable for the drying of green forage, the trays have been replaced by several superimposed conveyor belts which revolve alternately inversely, at the end of their turn dropping the product on the following belt. The multiple tray driers of this type, however, are rather complicated.

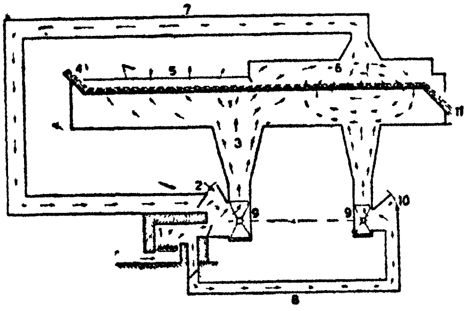
4. — BAND DRIERS

With stationary driers, it is easier to replace the superimposed, horizontal conveyor belts by a single conveyor belt of suitable length, moving horizontally. One of the first driers of this type is that of MASON (Chicago), constructed for the production of herbage meal. The conveyor belt, 50 m. long., moves in a shaft, 2 m. high, where the hot gases enter at a temperature of about 135° C.,

in inverse current, that is to say, above the dried material ready to be unloaded and are directed alternately from above to below and from below to above through the herbage. The hot gases entering the drier come into contact with the material in the final drying stage and make the temperature of the product in question relatively high. With this drier, there is no need to submit the forage to a preliminary natural drying in the field which, however, is necessary with a similar type, the Baley (Milwaukee), where the herbage is treated in the drying shaft by gases at a slightly lower temperature (about 120°C.) than in the former case. The hot gases pass in the same direction as the advancing movement of the herbage mass, which gets more thoroughly treated than with the

Fig. 2. — *Flow diagram of Ransome-Davies Drier.*

(1) Furnace — (2) Inlet of cold air — (3) Mixture with hot air — (4) Feed, wet material — (5) First drying stage — (6) Second drying stage — (7) Recuperation of hot air — (8) Hot gases from furnace — (9) Fans — (10) Cold air from atmosphere — (11) Delivery of dried material.



inverse current system. With the divisions in the shaft, the hot gases pass through the herbage in alternating currents. The herbage is cooled at the drier outlet by fresh air, brought in by inverse current.

In recent types of installations, the drier-shaft is usually divided by transversal partitions into 2 zones, where a different graduation of temperature of the hot gases makes it possible to regulate their action on the material to be dried, and where these gases can be repeatedly used in succession. It is a question essentially of dividing the drier into two zones, one humid and the other dry: into the first the gases are passed at a temperature of about 150°C.; into the second at about 100°C. The same furnace serves for the two zones. For the proper treatment of the herbage, the hot gases of the dry zone are cooled to the desired temperature by the addition of fresh air. In the drying section, the hot gases absorb relatively little moisture, so that by special fans, they can be passed through the herbage in the final drying stage several times. They are recovered as exhaust gases, heated and mixed with the fresh furnace gases and utilized for the drying of the wet material in the first drying zone. Here, the hot gases travel in the direction of the movement of the herbage while in the second zone these gases move in multiple directions. A well-known example of this type is the Ransome-Davies Drier (Fig. 2): however, in place of a conveyor band, it has a stationary belt of perforated sheet iron on which the herbage advances. This perforated belt has the disadvantage of being blocked up by particles of the herbage as it advances.

In comparison with the ordinary tray driers, the band driers have the advantage of continuous operation: the forage mat arrives without interruption in the drier and is unloaded in the dry stage. On the other hand, when stationary tray driers are used, the material has to be handled, first spread on the trays before drying and then removed when dried.

5. — CYLINDER DRIERS

In Denmark, a drier has been invented composed of two horizontal cylinders of different diameters, one inside the other. The annular space between the two cylinders receives the herbage, while the hot gases sent into the inner cylinder (closed at one end) traverse the lateral orifices, then the material to be dried and finally escapes through the external cylinder. Continuous operation is obtained by an uninterrupted advance of the wet material between the two cylinders, with subsequent delivery at the opposite end. This pushing through movement, however, compresses the herbage and leads to a lumpy formation. This inherent defect of the system connot be corrected as the continual intake of the fresh material makes it impossible to lossen the compact mass.

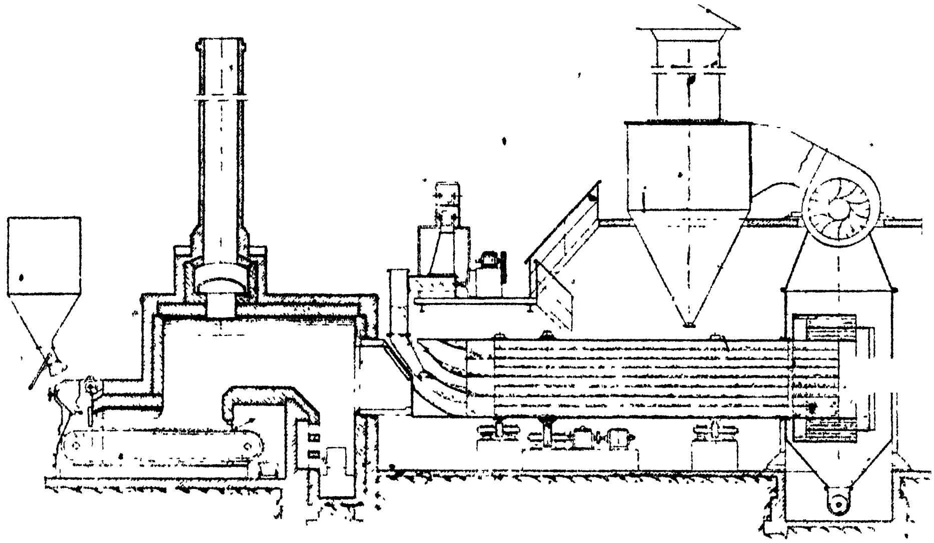
6. — DRUM DRIERS

These apparatuses (Fig. 3), created for the drying of products such as cereals, were subsequently found adapted for the drying of other types of material, provided that by means of a suitable preliminary treatment it can travel through the drier in the same sliding motion as grain. In Germany, the sugar-mills have had considerable success in the use of these driers for the drying of beet cossettes and leaves and later also green forage. Drying is generally effected in a gaseous current advancing in the same direction as the material to be dried, with the temperature of the hot gases varying, according to the nature of the material, between 250°C. and 600°C. on entry into the drier and about 100°C. on egress. The drum revolves slowly about its axis in order to impart to the material to be dried a constant slow descending movement, by means of the divisions in the interior of the drum intended to facilitate the sliding motion in question, in such a way as to bring the material into close contact with the hot gases. As the temperature is usually higher in the median and upper parts of the drum than in the lateral and lower parts, the purpose of the aforesaid divisions is also to move the mass throughout the transversal section of the drum to assure uniform drying.

Some trouble may be caused in drying by the eventual adherence of leaf fragments to the said divisions, causing incrustation or even combustion. A preliminary uniform preparation of beet leaves or herbage, therefore, is indispensable for drying in the drum. Regular, even feeding of the material prevents it taking fire, facilitates operations and assures a good quality dried forage. When herbage (lucerne, for example) has a high proportion of small leaves, it is impossible, even by chopping, to obtain a product with all elements taking

part in the necessary sliding movement. In this case, greater care in operation is required, with reduced temperatures of the hot gases (about 250° C. for lucerne); this naturally lowers the output of the drier.

FIG. 3. — *Drum drier with small mobile grate.*



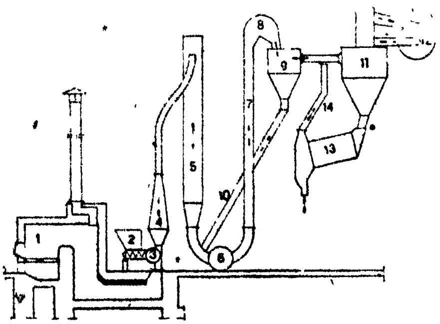
In general, the drum drier is still considered as the ' universal drier ', the best for use with material in which its components can slide against each other, and has also given successful results in the drying of green forage when preliminarily cut in small fragments.

7. — PNEUMATIC DRIERS

These apparatuses (Fig. 4) can be even better than drum driers for the drying of green forage. The best known is the Rema Rósin drier, which consists

FIG. 4. — *Pneumatic drier, Rema Rosin system.*

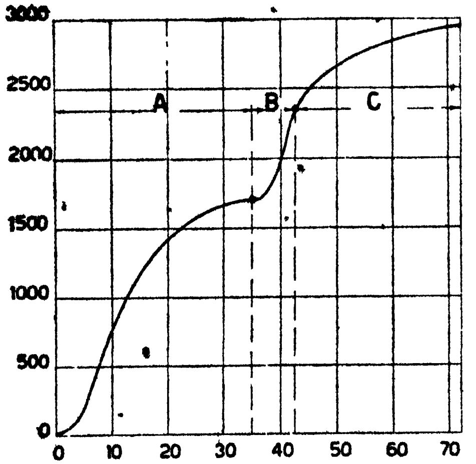
(1) Furnace — (2) Feed hopper — (3) Rotary propeller — (4) Ascending pipe of preliminary drier — (5) Descending tube of preliminary drier — (6) Rotary mill — (7) Ascending tube of return drier — (8) Cranked pipe — (9) Air draught separator — (10) Return slide to rotary mill — (11) Cyclone — (12) Fan — (13) Drying drum — (14) Air exhaust pipe of drying drum.



principally of a long pneumatic tube in which is combined the action of the hot gases, their velocity and the mechanical tratment of the material. The current advances in the same direction as the material to be dried, carrying

it along through the drier, thus carrying out simultaneously the two operations of drying and transport. The velocity of the gases is so high that the material to be dried only remains a few seconds in the drier and thus withstands the

FIG. 5. — *Total evaporation curve in a pneumatic drier, subordinate to course of material to be dried.*




*Abscissae* = Course (in metres) of fresh material.

*Ordinates* = Total evaporation in kg. at the rate of about 3000 kg. water evaporated per hour (transformation of 4125 kg. fresh material into 1036 kg. dried material containing 3 3 per cent. water).

*Evaporation:* (*A*) in the preliminary drier — (*B*) in the rotary mill — (*C*) in the return drier.

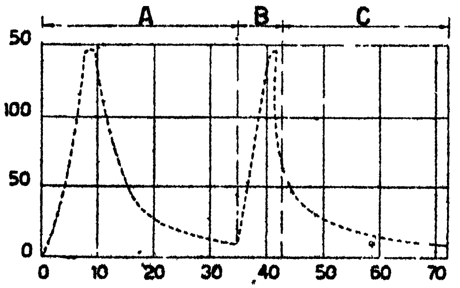
relatively high temperature of the gas current (over 700° C. at time of entering drier) without becoming heated to much over 70° C. and without undergong any loss in nutritive value. During the drying process, the fresh material

FIG. 6. — *Curve of the successive phases of evaporation in the pneumatic drier subordinate to course of material to be dried.*

*Abscissae* = Course (in metres) of material to be dried.

*Ordinates* = Kilograms of water evaporated per metre and per hour.

*A, B, C:* Same signification ad in Fig. 5.




also undergoes a mechanical action, in this sense that the parts of the stems incompletely dried are separated, crushed and returned for further drying. This process is repeated until all the material is fully dried.

In the pneumatic drier, full utilization is made of the heat and a study of the curves of the course of evaporation are of interest (Fig. 5, 6). In the first part of the drier, composed of an ascending and a descending pipe, 58 per cent. of the total evaporation is effected, with 48 per cent. in the first and 10 per

cent. in the second pipe. Towards the extremity of the descending tube, the gas current penetrates into the mill, where the part of the herbage incompletely dried is separated, cut up and returned to the drying current. There, evaporation is renewed. Over a brief course representing 10 per cent. of the total lenght of the pipe system, 23 per cent. of the total evaporation takes place (in the mill and immediately afterwards). The intensive drying action of the mill is explained by the following 2 facts: (*a*) creation of new evaporating surfaces by the division of the material to be dried into small fragments — (*b*) vigorous whirling of the herbage by hot gases, produced by the mill bats. In the following ascending tube, 12.8 per cent. of the total evaporation is effected, and finally 6.2 per cent. in the cranked pipe and the separator which follows (45)

The evaporation curve in the pneumatic drier definitely shows the considerable importance of an adequate combination of the action of the hot gases and the mechanical treament of the herbage during the drying process. It opens up new possibilities in the improvement of the technique of drying green forage, with a view to shortening the relatively long tube system (at present a little over 70 m. in length) so as to give the apparatus a more compact form.

8. — Treatment of dried herbage

Dried herbage is frequently put up in the form of meal or compressed in cubes with the addition of a binding substance such as molasses. Grinding is carried out in grinding mills attached to the driers: Hydraulic presses are used for compression into cubes. This system presents considerable advantages both as regards conservation of the product and transport, and consequently is becoming more and more general.

V.

## THE NUTRITIVE VALUE OF ARTIFICIALLY DRIED GREEN FODDERS AND THEIR UTILIZATION IN STOCK-FEEDING

Dr István Moskovits

The importance of artificial drying for agriculture will depend definitively on the value of the feed produced, value which may be expressed either from the standpoint of trade or as that which it represents as stock-feed. These two values may concur though this is not always the case: the market value depends on very variable factors; as regards the nutritive value, although it subject to considerable variation, it could, however, constitute a more objective criterion. It seems sufficient, therefore, to study the latter aspect only in this article.

The appreciable variations in nutrient content and feed value of artificially dried green fodders depend less on the adequate construction of the driers or their unexceptionable working (at present the actual drying process does not cause much loss) than on the variations in the raw material, which in turn are influenced

by many other factors — soil conditions, manuring, development of the plants at time of cutting, weather conditions, etc. This fact should always be taken into account in judging artificially dried forage and in many cases to it should be attributed the diversity in the results obtained from fodder analyses and feed tests reported in the pubblications on this subject.

In recent years, analyses and tests on artificially dried green fodders have increased to such an extent that it is impossible to discuss them in detail in this article, a discussion, moreover, which would tend to complicate and confuse the main issue. The results cited, therefore, will be limited to those of theoretical and practical importance in as far as they seem to be confirmed in practice. This study will deal chiefly with artificially dried grass, but other green forage crops subjected to this process and which are valuable as stockfeed will also be discussed.

## Nutrient content and nutritive value

### 1. — Composition and digestibility of artificially dried grass

Studies on these two questions naturally form the nucleus of the research work carried out by investigators. Being so many, it is impossible to cite all the results obtained; the following data, however, enable a fairly clear conception to be made. It is almost unnecessary to say that the most important is the content in crude protein and digestible 'true' protein. Table 16 shows the annual average composition of dried grass from cuttings made at Cambridge (England) from month to month over a period of three years.

TABLE 16. — *Data of* WOODMAN *and* NORMAN (11) *on the annual average composition of dried grass from cuttings made at Cambridge, from month to month, in 1929-1930-1931.*

| Composition | 1929 | 1930 | 1931 |
|---|---|---|---|
| Crude protein | 20 2 % | 19 2 % | 20 2 % |
| Ether extract | 6 5 | 4 0 | 4 6 |
| N-free extractives | 47 6 | 47 8 | 44 2 |
| Crude fibre | 16 9 | 20 7 | 21 6 |
| Ash | 7 0 | 6 7 | 7 7 |
| 'True' protein | 18 1 | 17.1 | 18 0 |
| Amides | 2.1 | 2.1 | 2 3 |
| Calcium | 1 7 | 1 4 | 1 2 |
| Phosphoric acid | 0 9 | 1 1 | 1 1 |

Table 16 shows the variations in composition from year to year. Table 17, on the other hand, indicates the influence of frequence of cutting on the crude protein content in dried grass obtained at Cambridge from 1928 to 1931 (see also p. 220).

TABLE 17. — *Results of studies made at Cambridge, over a period of 4 years, on the crude protein content of dried grass* (11).

| Year | Frequency of cutting | Crude protein content Maximum | Crude protein content Minimum |
|---|---|---|---|
| 1928 . . | Every three months . . . . . . . . . . . . . | 24.9 % | 19.3 % |
| 1929 . | Every month . . . . . . . . . . . . . . . | 25.9 | 18.2 |
| 1930 . | Every month . . . . . . . . . . . . . . | 22.2 | 16.1 |
| | Every month * . . . . . . . . . . . | 23.5 | 17.2 |
| 1931 . | Every month * . . . . . . . . . . . | 23.8 | 17.9 |
| | Every 5 weeks * . . . . . . . . . | 24.7 | 14.1 |
| | Every 5 weeks . . . . . . . . . . . . | 22.2 | 15.0 |

* Chemical fertilizer used.

TABLE 18. — *Composition and digestibility coefficients of artificially dried grassland herbage, determinations made by different investigators* [according to S. J. WATSON (18)].

| Composition | Results of 12 tests carried out at various localities by different investigators * — Composition: % of dry matter | Composition: Range | Digestibility: % | Digestibility: Range | Results of 14 tests made at Jealott's Hill — Composition % dry matter | Digestibility % | Average of all results (26) — Composition % of dry matter | Digestibility % |
|---|---|---|---|---|---|---|---|---|
| Ether extract . . | 4.57 | 3.50- 6.43 | 62.8 | 21.9-51.8 | 2.93 | 43.9 | 3.60 | 58.0 |
| Crude fibre . . . . | 21.55 | 15.41-30.30 | 74.9 | 58.6-84.5 | 23.62 | 78.0 | 22.60 | 76.7 |
| Crude protein . . | 18.03 | 9.88-24.64 | 70.8 | 40.5-78.2 | 16.20 | 66.9 | | ... |
| Ash . . . . . . . . | 11.11 | 8.69-13.41 | — | — | 11.10 | | 11.15 | — |
| N-free extractives . | 43.84 | 30.45-50.49 | 76.7 | 58.4-83.6 | 40.06 | 76.6 | 45.04 | 76.6 |
| 'True' protein . . | (a) 13.62 | 9.38-22.15 | | . | 14.62 | 65.4 | (c) 14.40 | ... |
| Organic matter . . | 88.89 | 86.59-91.40 | (b) 71.3 | 59.6-79.4 | 88.81 | 74.9 | 88.35 | (d) 73.8 |
| Average moisture content . . . . . | 10.2 % | | | | 13.8 % | | 12.3 % | |

* Experimenters: HONCAMP-WOODMAN, BEE and GRIFFITHS — HODGSON and KNOTT — NEWLANDER and JONES — C. J. WATSON and GODDAN — HODGSON, KNOTT, GRAVES and MURER
(a) 4 samples. — (b) 6 samples. — (c) 18 samples — (d) 20 samples

It is important to know to what extent artificial drying affects the digestibility of the different nutrient elements. In this respect, Table 18 supplies instructive data obtained from different tests carried out at different localities, that is, with a raw material far from uniform.

As seen in Table 18, the digestibility coefficients are very high. Allowance being made for the diversity of the raw material, variations also depend on technical peculiarities, eventual defects, competency in drying, etc. Type of installation and degree of temperature used seem to be very important. In general, the digestibility of the nutrient elements decreases as the duration and temperature of drying increase, especially if the material is left too long in contact with the highly heated air. In this case, the protein in particular undergoes various changes which lower considerably its digestibility.

Table 19 gives some interesting figures on dried and fresh material and indicates the influence of drying on composition and nutrient digestibility.

TABLE 19. — *Composition and digestibility of fresh and dried grass at Jealott's Hill* [according to WATSON (18)].

| Composition | Fresh grass | | Dried grass | |
|---|---|---|---|---|
| | Composition | Digestibility | Composition | Digestibility |
| Crude fibre | 21 9 % | 80 4 % | 21 9 % | 78 1 % |
| Crude protein | 17 6 | 77 6 | 17 8 | 72 6 |
| N-free extractives | 44 9 | 77 5 | 45 9 | 77 0 |
| Organic matter | 86 5 | 77 3 | 88.5 | 75 7 |
| 'True' protein | 13 1 | 70 8 | 16 9 | 72 2 |
| Ash | 13.5 | — | 11 5 | — |

It is seen, therefore, that drying has very little effect on digestibility. A similar result was obtained by the Bureau of Dairy Industry of the U. S. Federal Department of Agriculture (46) which, with the collaboration of two experiment stations, carried out feed tests using artificially dried herbage: pasture herbage cut every 2-3 weeks contained throughout the vegetative period, up to 23 per cent. protein (18 per cent. being digestible crude protein) and little crude fibre, in all, 65 per cent. digestible nutrient principles.

According to WATSON (18), the content of true protein appears to increase during artificial drying. Naturally, this increase does not necessarily depend on the formation of true protein during the drying process; it is more probable that, during the process itself, the physical properties of the nitrogenous substances are altered. As final result, in the artificially dried product the 'protein equivalent' * is closer to the crude protein content than is the case with the fresh material.

* The protein equivalent or P. E. (coefficient employed in England) = digestible true protein + $\frac{\text{amides}}{2}$. As amide = digestible crude protein — digestible true protein, it may be taken that:

$$\text{P. E.} = \text{digestible true protein} + \frac{\text{digestible crude protein} - \text{digestible true protein}}{2}$$

and on making the substraction indicated:

$$\text{P. E.} = \frac{\text{digestible true protein} + \text{digestible crude protein.}}{2}$$

Table 20 gives comparative data on the digestibility of dried and fresh grass but, at the same time, shows the influence of different types of driers and of variation in temperature and duration of the process. These data were determined by S. J. WATSON and W. S. FERGUSON (47).

TABLE 20. — *Comparative digestibility (in %) of nutrient principles in fresh amd artificially dried grass respectively.*

| Composition | Fresh grass | Artificially dried | |
|---|---|---|---|
| | | in a band drier at 200° C for 20 minutes | in a pneumatic drier at 600° C for 15 seconds |
| Organic matter | 77 3 % | 75 7 % | 70 2 % |
| Ether extract | 38 9 | 53 1 | 55 8 |
| Crude fibre | 80 4 | 78 1 | 68 1 |
| N-free extractives | 77 6 | 77 0 | 75 8 |
| Crude protein | 77 6 | 72 6 | 58 9 |
| True protein | 70 8 | 72 2 | 56 7 |

Table 21, in which the digestibility coefficients of crude protein and fibre in grassland hay and artificially dried grass are compared, shows the superiority of artificial drying in this respect.

TABLE 21. — *Comparison of the digestibility coefficients of grassland hay and artificially dried grass as regards crude protein and fibre.*

| Forage studied | Digestibility coefficients | |
|---|---|---|
| | Crude protein | Fibre |
| | % | % |
| Grassland hay, average quality (according to KELLNER-FINGERLING) | 57 | 59 |
| Dried grass (WATSON) | 72 64 | 78 06 |
| ,, ,, (at Cambridge) | ... | never > 78 6 |
| ,, ,, (HONCAMP) | 82 8 | 97 4 |

Table 22 compares the percentages of digestible nutrients contained in artificially dried grass and in grassland hay.

The figures in Table 22 also show that the artificially dried grass is much richer in the important digestible nutrients than the 'excellent' quality hay.

Particularly important, as has already been pointed out, is the high protein content. The biological value of this protein, as compared with the protein contained in other similar forages, is seen from the results of experiments carried out by the Hannah Dairy Research Institute, Ayr (48) which are briefly summarized in Table 23.

TABLE 22. — *Comparison of percentages of digestible nutrients contained in artificially dried grass and in grassland hay.*

| Composition | Percentage of digestible nutrients | | | |
|---|---|---|---|---|
| | In artificially dried grass | | In grassland hay (According to KELLNER-FINGERLING) | |
| | According to WATSON | According to WOODMAN and NORMAN | Excellent | Good |
| Digestible crude protein | 10 2 % | 14 7 % | 9 2 % | 5 4 % |
| Crude fibre | 17 7 | 17 6 | 12 7 | 15 0 |
| True protein | 7 6 | ... | 6 5 | 3 8 |
| N-free extractives | 27 7 | 38 4 | 30 1 | 25 7 |
| Ether extract | 0 8 | 1 8 | 1 5 | 1 0 |
| Water | 12 0 | ... | 16 0 | 14 3 |

According to the data given in Table 23, artificial drying does not lower, or if so, only very slightly, the biological value of the grass which is very high as in the fresh material. These results agree with the others obtained and cit-

TABLE 23. — *Biological value of different proteins for milk production, from the experiments made by the Hannah Dairy Research Institute, Ayr, (Scotland).*

| Protein feeds | Biological value for milk production |
|---|---|
| Fresh or dried spring grass<br>Summer grass silage<br>Powdered blood dried at a low temperature | 75-80 % |
| Fresh or dried autumn grass<br>Pea or bean meal | 60-65 % |
| Powdered blood dried at a high temperature<br>Tankage | 55-60 % |
| Groundnut presscake<br>Groundnut presscake and maize flakes | 50-55 % |
| Linseed presscake<br>Linseed meal | 44-50 % |

ed in the literature on the subject, some authors, for example, have found that the biological value of the protein in linseed presscake as against that in artificially dried grass, is in the ratio of 2 : 3.

2. — GLOBAL NUTRITIVE VALUE OF ARTIFICIALLY DRIED GRASS

The high content of nutrients in artificially dried grass and their easy digestibility show that this product must have a high global nutritive value. Before going into details on the subject, a brief explanation of method of calculation will be useful.

As is known, the total nutritive value of a forage or any other stockfeed is usually evaluated as starch equivalent. In calculating the starch equivalent of grassland hay, KELLNER states· ' For coarse forages (straw and hay), it is not advisable to use the nutritive coefficients as such, but on the contrary, for crude fibre (naturally not digestible) contained in the forage, to correct the starch value calculated as above by 0.58 '. This correction appears to be necessary owing to the fact that dry fodder requires longer mastication than the soft moisture-containing tissues of green forage and that the greater bulk of undigested material of the former load the digestive apparatus to a larger extent than grass. It is seen, therefore, that for green forage, KELLENER advises a correction of 0.29 while, for dry fodder he has adopted that of 0.58 mentioned above. Different English investigators, in particular, H. E. WOODMAN (Cambridge University) considers that for the dry matter of very young grass, the correction factor cannot be used, as the deduction to be made cannot be the same if the forage contains a relatively small amount of lighified fibre than if, like ordinary hay, it is rich in lignin. According to WOODMAN, therefore, ordinary artificially dried grass, which is frequently put up for sale immediately after preparation and moistened before being given to the stoock, should not be subjected to a correction different from that applied to green forage. Thus, this investigator calculates on the content of crude fibre when the forage contains 80 per cent. water and advocates the same correction as that used for green forage.

This question, however, has not been definitely settled, but, with the different data regarding starch equivalents, it is necessary to know with what correction they have been calculated.

After these preliminary remarks, some determinations on the nutritive value of artificially dried grass are given. Table 24 contains the results of analyses carried out on this forage at the Federal Agricultural Experiment Institution at Liebefeld (Bern) (49).

Table 25 indicates the starch equivalents of samples of artificially dried grassland herbage, the composition and coefficients of digestibility of which had already been determined (see Table 18).

It would be superfluous to cite the results of other similar determinations. J. LANDIS (49) concludes that, in general, the average starch equivalent of artificially dried grass would lie between 45 and 53 and that the digestible protein value would be round about 10. In a very few cases, the starch equivalent has been as much as 60. These figures are not in entire agreement with those of the drier manufacturers who base their calculations on a starch equivalent of 60.

To supplement, mention may also be made of a determination of the nutritive value of dried grass made by M. HUSBY at the Institute for Animal Nutri-

TABLE 24. — *Analyses of different grass samples (dried or fresh) made*

| Samples analyzed | In the | |
|---|---|---|
| | Crude protein | Crude fat |
| (1) Grass dried artificially after extraction of sap | 14.2 % | 3.2 % |
| (2) Juice extract of this grass (1 and 2: samples from the R G Foods Company, Hatten, England) | 19.1 | 2.4 * |
| (3) Artificially dried grass (From Clyde Higgs, Stratford-on-Avon, England) | 16.7 | 4.0 |
| (4) Artificially dried grass (From F. Bischel, St Imier, Switzerland) | 13.2 | 4.6 |
| (5) Gramineous and clover forage mixture dried artificially (From 'Zentralschweizerische Kraftwerke', Luzern, Switzerland) | 18.3 | 4.9 |
| (6) Fresh grass | 16.4 | 4.0 |
| (7) Artificially dried grass (6 and 7: samples from the 'Maschinenfabrick Ammann', Langenthal, Switzerland) | 16.5 | 3.9 |
| (8) Forage mixture of clover and young grasses, dried on Swedish racks at Liebefeld in 1936 Average sample of 4 hay lots | 21.2 | 3.4 |
| (9) Artificially dried grass, Liebefeld, 1937 | 17.0 | 3.6 |
| (10) Artificially dried grass, Liebefeld, 1937 | 21.3 | 4.0 |

* Determinations 'in vitro' of digestibility.

TABLE 25. — *Starch equivalents of different samples of artificially dried grassland herbage determined by different experimenters* * [from WATSON (18)].

| | Starch equivalent % dry matter | | | | | |
|---|---|---|---|---|---|---|
| | Correction factor: 0.58 | | | Correction factor: 0.29 | | |
| | Determined A | Calculated B | Difference A-B | Determined A | Calculated B | Difference A-B |
| Average equivalent obtained in 12 tests by different workers * | 54.7 % | 54.5 % | + 0.2 % | 61.0 % | 60.8 % | + 0.2 % |
| Average equivalent obtained in 14 tests made at Jealott's Hill | 52.2 | 52.2 | 0 | 59.1 | 59.1 | 0 |

* Experimenters: WOODMAN, BEE and GRIFFITHS — C. J. WATSON — HODGSON and KNOTT — HONCAMP — NEWLANDER and JONES — HODGSON, GRAVES and MURER.

*Federal Agricultural Experiment Institution, Liebefeld (Bern).*

| dry matter | | | | | In dried grass containing 10 % moisture | | |
|---|---|---|---|---|---|---|---|
| N free extractives | Crude fibre | Ash | True protein | Digestible true protein * * | Digestible true protein * | Starch equivalent after correction | |
| | | | | | | 0.29 | 0.58 |
| 48.3 % | 27.0 % | 2.3 % | 12.2 % | 9.5 % | 8.55 % | 53.8 | 47.6 |
| 51.6 | 2.9 | 24.0 | 15.0 | 9.8 | — | — | — |
| 42.7 | 25.7 | 10.9 | 15.7 | 12.6 | 11.3 | 51.9 | 45.9 |
| 49.0 | 26.0 | 7.2 | 11.4 | 9.4 | 8.5 | 55.1 | 49.1 |
| 45.5 | 20.1 | 11.2 | 17.0 | 12.8 | 11.5 | 58.8 | 53.6 |
| 49.6 | 20.0 | 10.0 | 14.1 | 11.7 | — | — | — |
| 50.8 | 19.3 | 9.5 | 14.3 | 27.0 | 10.8 | 62.1 | 57.1 |
| 38.6 | 24.6 | 12.2 | 17.5 | 23.0 | 11.7 | 48.4 | 42.6 |
| 45.4 | 23.4 | 10.6 | 14.8 | 11.3 | 10.2 | 54.0 | 47.9 |
| 40.9 | 21.4 | 12.4 | 15.6 | 15.0 | 13.3 | 53.4 | 48.1 |

tion of the Higher School of Agriculture of Norway (50). The dried grass tested had the following coefficients of digestibility.

| | | | |
|---|---|---|---|
| Dry matter | 66 | N-free extractives | 72 |
| Organic matter | 68 | Crude fibre | 65 |
| Protein | 64 | Crude fat | 48 |

This investigator obtained the following nutritive values per 100 kg. of dried grass:

54 Scandinavian fodder units

60 fodder units for fattening (by 1650 calories net).

In other words:

To 1.85 kg. of this grass corresponded 1 Scandinavian fodder unit, containing 122 g. digestible protein.

To 1.67 kg. of this grass corresponded 1 fodder unit for fattening, containing 110 g digestible protein.

Consequently, 1.7 — 1.8 kg. of this forage procure ruminants 1 fodder unit.

The comparison of the nutritive values of artificially dried grass with other well known stockfeeds is of interest. This comparison is given in Table 26, all data with the exception of those for dried grass, have been taken from KELLNER.

TABLE 26. — *Average content of digestible protein and average starch equivalent of artificially dried grass and some other stockfeeds.*

| Stockfeeds compared | Digestible protein | Starch equivalent |
|---|---|---|
| *Artificially dried grass*, average quality | *10.0 %* | *45-53.0 %* |
| Hay, very good quality | 5.0 | 36.2 |
| Oats, average quality | 7.2 | 59.7 |
| Fodder barley | 8.0 | 67.9 |
| Maize, average quality | 6.6 | 81.5 |
| Wheat bran, fine | 11.1 | 48.1 |
| Palm kernel presscake | 13.1 | 70.2 |
| Dried brewers' grains | 14.1 | 50.3 |

3. — VITAMIN CONTENT *

The partisans of artificial drying have always emphasized that this process favours the conservation of vitamins in the forage. Investigations made on the subject confirm this opinion, excepting in the case of vitamin D.

Particularly important is the conservation of vitamin A, that is, in its precursor form, carotene or provitamin A. While natural drying destroys these substances to a considerable extent, artificial drying as usually carried out, on the contrary, largely preserves them. As is known carotene or provitamin A stimulates the growth and live-weight increase of young stock and produces the yellow coloration of butter and egg yolk. The importance of their conservation in artificially dried herbage is definitely shown by the following observation: when cattle were winter fed with this herbage, the milk, butter and meat contained 2-3 times more vitamin A than was the case with the usual feed.

The data given in Table 27 support these assertions. The vitamin A content can easily be estimated from the carotene percentage. Whith proper drying giving a product which maintains the green colour of the fresh herbage, the loss in carotene is very little, as seen in the following table..

Young grass usually contains more carotene than grass of older growth. With artificially dried grass, as a rule, the higher the crude protein content, the higher the carotene content. The values obtained in practice lie, almost with out exception, between 25 and 50 mg. carotene per 100 mg. dry matter; 30 mg. is considered a good average.

* See also p. 220.

TABLE 27. — *Carotene content (in mg. per 100 g. of dry matter) of 3 samples of grass, before and after artificial drying determined at Jealott's Hill* (19).

| Sample | Date of cutting | Carotene content | | Percentage carotene conserved |
|---|---|---|---|---|
| | | In fresh grass | In dried grass | |
| No 1 . . . . . . . | 29-X -1931 | 42.2 mg | 40 4 mg | 95 7 |
| No 2 . . . . . | 3-XI-1931 | 48 4 | 43 9 | 90 7 |
| No 3 . . . . . . . . . . . | 11-XI-1931 | 56 2 | 47 5 | 84 3 |

Hay contains 1-5 mg. carotene per 100 g. dry matter. The loss in this substance produced during natural drying must not be attributed to the drying process itself, but to decomposition caused by the sun. As regards the loss in carotene which takes place during incorrect artificial drying, this is generally due to overheating or to excessive duration of the heating period, loss, however, may also be caused by too long storage of a product not baled or ground. In England, even in trade, considerable importance is attached to the carotene content of artificially dried herbage in sales contracts. the seller frequently guarantees a certain carotene content. As this herbage is used in the preparation of the feed mixtures placed on the market it is chiefly for this reason that frequently the price paid for dried grass rich in carotene is in excess of the actual market value of the nutrient elements it contains.

Regarding the influence of the carotene content, that is, vitamin A, of stockfeed on the colour of butter, S. J. WATSON indicates the following figures given in Table 28.

TABLE 28. — *Influence of vitamin A content of stockfeed on colour of butter.*

| Stockfeeds studied | Lovibund yellow units | Vitamin A units |
|---|---|---|
| Normal concentrate feed . . . . . . . . . . . . . . . | 1.2 | 0 450 |
| Artificially dried grass . . . . . . . . . . . . . . . . | 10 6 | 0 890 |
| A. I. V silage . . . . . . . . . . . . . . . . . . . . . | 11.1 | . . . |
| Summer green grass . . . . . . . . . . . . . . . . . | 15 0 | approx 1 000 |

If, on the one hand, the direct action of the sun on forage left to dry in the open reduces the vitamin A content in the final product, on the other, it has the advantage of transforming into active vitamin D the ergosterol contained in the green forage. This change, however, does not take place if the forage is dried artificially.

## 4. — MINERAL CONTENT

As regards the mineral content of artificially dried grass, some data are given in Table 16 and are now supplemented in the following table. Taking as a basis, 14 analyses made at Jealott's Hill and 10 others made by different investigators (WOODMAN, BEE and GRIFFITHS - HODGSON and KNOTT - NEWLANDER and JONES - HODGSON, KNOTT, GRAVES and MURER) on artificially dried grassland herbage taken from widely differing localities, S. J. WATSON (18), for the total ash, calcium and phosphorus contents, calculated the average values indicated in Table 29.

TABLE 29. — *Average total ash, calcium and phosphorus contents of artificially dried grassland herbage, taken from 24 samples.*

| | % of dry matter (mean) | Range |
|---|---|---|
| Ash | 11.36 % | 8.29-14.64 % |
| Calcium (CaO) | 0.91 | 0.59- 1.83 |
| Phosphorus ($P_2O_5$) | 0.76 | 0.45- 1.00 |

The range is naturally fairly wide, but is not surprising if the diversity of origin of the herbage is taken into account. The mineral content, however, is remarkably high, a fact which WATSON attributes to the use of young grass for artificial drying.

Table 30 compares the mineral content of artificially dried grass with that of some other well known stockfeeds.

TABLE 30. — *Comparison of the mineral content of artificially dried grass with that of other stockfeeds* *

| Feedstuff | Total mineral content | Calcium (CaO) | Phosphorus ($P_2O_5$) | Potash ($K_2O$) | Chlorine (Cl) |
|---|---|---|---|---|---|
| *Artificially dried grass* | *8.6 %* | *0.80 %* | *0.80 %* | *3.5 %* | *1.20 %* |
| Oats | 3.1 | 0.15 | 1.0 | 0.7 | 0.05 |
| Maize | 1.3 | 0.01 | 1.7 | 0.4 | 0.07 |
| Brewers' grains | 3.9 | 0.30 | 1.3 | 0.1 | 0.06 |
| Palm kernel presscake | 3.8 | 0.30 | 1.1 | 0.5 | 0.16 |
| Hay, average quality | ... | 1.00 | 0.43 | 1.6 | ... |

* Data taken from 'Imperial Chemical Industries, Ltd.' — DYCKERHOFF (44) — E. BUCHER (49).

The striking point in Table 30 is the high content of artificially dried grass in calcium, potash and chlorine; it is to this high content that, in part, the favourable influence of this herbage on the health and output of livestock should be attributed.

### 5. — PRACTICAL CLASSIFICATION

As has already been mentioned, the nutrient content and the nutritive value of artificially dried herbage may vary within fairly wide limits. Therefore, it is in the interest of both the seller and the consumer to have a classification of the different grades of this herbage as compared with good meadow hay. Table 31 reproduces a classification of this type as compiled by J. S. WATSON (52).

TABLE 31. — *Classification of artificially dried grass and good meadow hay* (according to S. J. WATSON)

| Quality | Protein | Appearance | Starch equivalent lb. per 100 lb. | Protein equivalent | Mineral matter % | Carotene mgm. per 100 gm. |
|---|---|---|---|---|---|---|
| Best | 17 (16 and over) | Early, short 4-6 in. Very leafy. No stem | 59.6 | 11.1 | * 8.5 | 32.5 |
| Medium | 14 (12-16) | Pre-hay stage. Leafy. Early grasses in flower | 57.8 | 8.3 | * 8.5 | 22.5 |
| Super hay | 11 (10-12) | Late flowering stage. Stemmy | 55.9 | 5.4 | * 8.5 | 15.5 |
| Meadow hay | 8 | Ordinary hay of good quality | 31.0 | 4.0 | 6.4 | 2.5 |

* A very variable figure containing about 1.0 % of lime (CaO), 0.75 to 1.0 % of phosphoric acid ($P_2O_5$) and 3.0 to 3.5 % of potash ($K_2O$). Good hay will contain about 1 % of CaO but only 0.4 % $P_2O_5$ and 1.6 % $K_2O$.

The Grass Driers' Association suggests classification according to grade agreeing in the main with that given in Table 31.

TABLE 32. — *Classification of artificially dried grass with a 10 per cent moisture content as suggested by the Grass Driers' Association* (18)

| Grade | Description | Crude protein % | Starch equivalent lb. per 100 lb. Using fibre correction of 0.29 | Starch equivalent lb. per 100 lb. Using fibre correction of 0.58 | Protein equivalent % | Carotene in mg. per 100 g. |
|---|---|---|---|---|---|---|
| 1 . . | Extra leafy. First quality made from young leafy grass . . | 17 and over | 55.1 | 49.8 | 12.5 | 250 |
| 2 . . | Leafy. Second quality. Some of early grasses just in head . | 13 to 17 | 53.3 | 47.2 | 9.6 | 200-250 |
| 3 . . | Mature. Super-hay. Grasses in early flowering stage . . | 10 to 13 | 51.2 | 44.2 | 6.3 | 150-200 |

### 6. — Composition, digestibility and nutritive value of other green forages dried artificially

Besides young grass, endeavours have been made to apply artificial drying to many other forage plants and even to several industrial by-products. In this article only the studies on the artificial drying of various green forage crops will be discussed. It may be said straight away that in this case the advantages of artificial drying are not the same as for grass.

Table 33 gives the coefficients of digestibility determined by Richter and Ehinger (53) for different artificially dried green forage crops, using as test animals ruminants and pigs.

The results of these experiments led the investigators in question to suppose that the method of drying has a considerable influence on the digestibility of the protein of the said forages, a fact which has already been pointed out in regard to artificially dried grass.

That which is striking is the difference, often considerable, in the coefficients of digestibility determined, for pigs on the one hand, and for ruminants on the other. As regards the organic matter of lucerne, yellow-flowered lupin and the two autumn fodder mixtures, the coefficients of digestibility, for pigs, were relatively low. These animals digest the crude and true protein of the forages in question to a much lesser extent than ruminants.

Among the green forage crops chiefly studied are lucerne, clover and beet tops; further details on the subject will be given later on. Table 34 reproduces a review by S. J. Watson (18) on the composition, digestibility, and nutritive value of artificially dried lucerne, sun-dried lucerne and artificially dried clover.

To the data in Table 34, Watson adds some explanatory notes from which the following facts have been taken. The most significant differences between *artificially dried lucerne* and artificially dried grassland herbage arises in the digestibility coefficients. The fibre of lucerne is considerably lower in digestibility (48.1 per cent.) than that of grassland herbage (average 76.6 per cent.), due probably to the early lignification of the fibre in the former. In sun-dried lucerne, digestibility is still lower while in the leaf meal it is but little better. The ether extract in dried lucerne is less digestible than in grassland herbage also artificially dried, but is of little importance. As regards the digestibility of crude protein and N-free extractives, this is more or less equal in both forages. These findings apply with equal force to the sun-dried samples.

A comparison of the starch equivalents is of interest. Despite a higher content in digestible protein, artificially dried lucerne has a starch equivalent inferior to that of grassland herbage similarly dried. The corrected starch equivalent values, in which the correction factor of 0.29 has been applied, show differences between the determined and calculated values. In view of the low digestibility of the fibre in artificially dried lucerne, the use of the 0.29 correction factor does not appear justified.

Watson concludes that artificially dried lucerne is valuable as a source of protein but as a source of starch equivalent, it can only be classed as a roughage

TABLE 33 — *Coefficients of digestibility of different artificially dried green forages*
*Animals used in experiments, ruminants and pigs*

| Artificially dried green forage | Animals tested | Number of tests | Coefficients of digestibility: Organic matter | Crude protein | True protein | Crude fat | Crude fibre | N free extractives |
|---|---|---|---|---|---|---|---|---|
| (1) Young lucerne | Ruminants | 2 | 71 % | 78[illegible] | 76[illegible] | 31[illegible] | 56 % | 80 % |
| | Pigs | 2 | 56.0 | 61.1 | 63.2 | 50.5 | 31.8 | 70.8 |
| (2) Sweet lupin, yellow-flowered | Ruminants | 2 | 69 | 65 | 70 | 69 | 61 | 78 |
| | Pigs | 2 | 56.6 | 49.3 | 56.0 | 31.5 | 44.8 | 75.5 |
| (3) Autumn forage mixture (vetches, beans, sweet lupins, young maize, oats, barley shoots) | Cattle | 4 | 62.6 | 70.3 | 65.2 | 30.3 | 53.3 | 68.4 |
| | Pigs | 2 | 53.4 | 58.0 | 57.0 | 29.9 | 46.0 | 59.2 |
| (4) Autumn forage mixture (vetches and beans) | Ruminants | 3 | 67.2 | 75.4 | 74.3 | 65.3 | 49.8 | 77.1 |
| | Pigs | 2 | 52.5 | 67.1 | 65.3 | 68.3 | 30.9 | 60.5 |
| (5) Forage colza | Ruminants | 4 | 71.5 | 58.6 | 54.1 | 60.8 | 56.2 | 82.8 |
| | Pigs | 4 | 65.0 | 42.7 | 31.1 | 64 | 50.8 | 77.9 |
| (6) Landsberg forage mixture (sand vetch, crimson clover, Italian ryegrass | Ruminants | 3 | 78.1 | 60.8 | 65.4 | 71.6 | 73.1 | 84.7 |
| | Pigs | 2 | 65.1 | 39.0 | 42.4 | 50.[illegible] | 54.6 | 79.4 |
| (7) Beet leaves and tops | Ruminants | 7 | 69.9 | 64.4 | 54.6 | | 48.9 | 81.8 |
| | Pigs | 7 | 66.8 | 46.3 | 40.3 | | 44.0 | 82.6 |

TABLE 34.— *Composition, digestibility and nutritive value of artificially dried lucerne and of sun-dried lucerne and artificially dried clover.*

| | Artificially-dried lucerne | | | | Sun-dried lucerne | | Artificially-dried clover | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | (WATSON and HORTON, Jealott's Hill) | (WOODMAN and EDEN, Cambridge) | | Average | (WOODMAN and EDEN, Cambridge) | | (WATSON and HORTON, Jealott's Hill) | | (EDIN, BERGLUND AND ANDERSSON, SWEDEN) | Average of all three |
| | Advanced stage | Pre-bud stage | Early flower stage | | Lucerne meal (America) | Lucerne leaf meal (America) | Sample No. 1 | Sample No. 2 | Mixture: 85 % clover, 15 % timothy | |
| *Composition per cent. of dry matter:* | 1.98% | 3.19% | 2.64% | 2.60% | 1.28% | 2.06% | 1.62% | 1.42% | 3.30% | 2.11% |
| Ether extract | 24.51 | 19.82 | 26.93 | 23.75 | 36.26 | 17.50 | 33.04 | 25.74 | 19.18 | 25.99 |
| Fibre | 13.97 | 24.45 | 17.82 | 18.75 | 13.27 | 23.53 | 9.49 | 8.81 | 10.79 | 9.21 |
| Crude protein | 9.46 | 12.56 | 11.21 | 11.08 | 9.43 | 12.20 | ... | ... | ... | ... |
| Ash | 50.08 | 39.98 | 41.40 | 43.82 | 39.76 | 44.62 | 47.83 | 50.20 | 47.11 | 48.38 |
| N-free extractives | 90.54 | 87.44 | 88.79 | 90.57 | 87.80 | ... | ... | ... | ... | ... |
| Organic matter | 90.54 | 87.44 | 88.79 | 88.92 | 90.57 | 87.80 | ... | ... | ... | ... |
| *Digestibility per cent:* | | | | | | | | | | |
| Organic matter | 63.1 % | 69.2 % | 63.5 % | 65.3 % | 54.8 % | 69.6 % | 63.9 % | 56.0 % | 66.0 % | 62.0 % |
| Ether extract | 43.7 | 45.5 | 28.3 | 39.2 | 25.1 | ... | 51.0 | 36.5 | 54.0 | 47.2 |
| Fibre | 46.1 | 52.6 | 45.6 | 48.1 | 36.4 | 49.9 | 67.6 | 34.4 | 60.0 | 54.7 |
| Crude protein | 62.6 | 71.6 | 71.4 | 68.5 | 69.4 | 76.3 | 56.1 | 53.4 | 51.0 | 53.5 |
| N-free extractives | 72.3 | 78.0 | 73.9 | 74.7 | 67.8 | 77.6 | 69.7 | 68.7 | 75.0 | 71.1 |
| *Nutrients per cent. dry matter:* | | | | | | | | | | |
| Digestible crude protein | 8.74% | 17.51% | 12.72% | 14.99% | 9.21% | 17.95% | 5.32% | 7.39% | 10.00% | 7.57% |
| Digestible true protein | 7.65 | 13.81 | 11.05 | 10.84 | 7.38 | 16.74 | 4.21 | 5.21 | 8.03 | 5.82 |
| Starch equivalent (*determined*) | 42.1 | 47.6 | 39.1 | 42.9 | 26.7 | 49.0 | 42.1 | 34.3 | 46.7 | 41.0 |
| Starch equivalent (*calculated*) | 50.3 | 59.4 | 53.6 | 54.4 | 49.7 | 58.6 | 46.4 | 50.2 | 55.2 | 50.6 |
| Difference | — 8.2 | — 11.8 | — 14.5 | — 11.5 | — 23.0 | — 9.6 | — 4.3 | — 15.9 | — 8.5 | — 9.6 |
| Corrected starch equivalent *determined* | 49.2 | 53.3 | 46.8 | 49.8 | 37.2 | 54.1 | 51.6 | 41.7 | 52.2 | 48.5 |
| Corrected starch equivalent *calculated* | 57.7 | 64.1 | 60.1 | 60.6 | 57.3 | 63.5 | 55.0 | 57.6 | 61.2 | 57.9 |
| Difference | — 8.1 | — 10.8 | — 13.3 | — 10.8 | — 20.1 | — 9.4 | — 3.4 | — 15.9 | — 9.0 | — 9.4 |

Sun-cured lucerne has a still lower nutritive value, while the leaf meal comes in the same category as the whole crop cut in the pre-bud stage and dried artificially.

Table 34 also supplies data on the composition, digestibility and nutritive value of *artificially dried clover.* The digestibility coefficients of this forage are about equal to those determined for artificially dried lucerne though, in general, they are inferior to those obtained for artificially dried grassland herbage. This Table also indicates the corrected starch equivalent, using the correction factor for fibre of 0.29, a use which does not seem justified in the case of clover owing to the relatively low digestibility of the fibre contained.

TABLE 35. — *Digestibility coefficients and nutritive value of fresh and dried beet leaves.*

| Experimenters | Fresh leaves | Artificially dried leaves | | | | |
|---|---|---|---|---|---|---|
| | Digestibility coefficients in %, of dry matter | | | | Digestible true protein | Starch equivalent |
| | Crude protein | Crude protein | N free extractives | Fibre | % of dry matter | |
| HONCAMP, 1907 . . . | | 41.3 % (36.6-48.1) | 81.7 % (75.0-86.5) | | | |
| HONCAMP, 1916 . . . | | 53.2 (45.2-58.3) | 83.4 | | | |
| LEHMANN, 1931 . . . | 73.8 % | | | | | |
| VON KURFIEC, 1932: | | | | | | |
| leaves washed . . . | | 58.65 | | | 4.3 % | 46.4 % |
| leaves not washed . | | 46.30 | | | 3.7 | 43.1 |
| TANGL . . . . . . . . . | 75.9 | | | | | |
| NITZSCHE, 1930 . . . | 85.0 | | | | | |
| RICHTER and EHINGER, 1930* | | | | | | |
| (Ruminants) . . . . | | 64.4 | | 48.9 | | |
| (Pigs) . . . . . . . | | 46.3 | | 44.9 | | |
| SCHEUNERT . . . . . | | 70.3 | | | | |

* Leaves and tops

For many years, considerable attention has been turned to the *artificial drying of beet tops*, especially in Germany. Table 33 gives data on their digestibility as determined by RICHTER and EHINGER for sheep and pigs. As regards the crude protein digestibility of beet leaves, NITZSCHE (54) found 85 per cent. in the fresh leaves but only 46 per cent. in the waste leaves. During washing of the leaves and the chopping and drying process, loss in digestible protein totalled 32 per cent., of which 11.8 per cent. during drying. In this case, loss depended largely on the initial temperature of the heated gas, when above 700°C. the protein digestibility was lowered considerably; below 700°C., less change took place in digestibility. The technique of drying green forage, however, is continually

improving, as seen by recent experiments which have given results much superior to those obtained in the past.

Table 35 combines the data obtained by different investigators on the digestibility and nutritive value of fresh and artificially dried beet leaves.

## Use of artificially dried green forage crops in stockfeeding

Although artificial drying is a relatively recent practice and only employed on a large scale for a few years, many experiments have given results which form a satisfactory basis for its general application. Without going into details on these experiments, some indications will be given on the value of these new fodders in the feeding of different farm animals and on their mode of use, to show their pratical importance.

As has already been pointed out, artificially dried herbage contains very little roughage but much protein. To obtain full use and value of this herbage it should be added to bulky fodder with a low protein content. Its chief advantages in stockfeeding are considered as. good influence on the health, growth and productivity of the animal—lower frequency in digestive troubles, abortion, easier calving—higher vitamin A content of the milk, resulting in more rapid growth of the calves. In fact, artificially dried grassland herbage has proved very suitable for the rearing of young stock owing to its high content in vitamins, mineral substances and the elements forming haemoglobin. It also maintains milk production uniform throughout the year, especially during the transition periods (beginning and end of the grazing season, change to green fodder). It is also an important adjunct in making winter feeding more rational; with this product, it is possible to do without other concentrates without lowering output. At the same time, the nutritive value of animal products (milk, butter, cheese, eggs, etc.) increases.

As regards the form under which artificially dried grassland herbage should be given, for young stock, milch cows and horses, it should be whole or chopped but not ground. In the meal form, it is suitable for adding to feed mixtures for pigs and poultry.

Artificially dried herbage can absorb moisture up to 2-3 times its own weight, which makes it very suitable for dairy stock as it replaces not only concentrate feeds but also succulent forages. When water is supplied automatically in the stable, the soaking of the herbage becomes superfluous. Frequently, cooked potatoes or silage are added; in this case, the herbage is softened by the liquid contained in the added product, swells and releases its nutrient elements among the feed mixture. When this herbage is given dry, three feeds per day are necessary; high milk yielders are the animals that obtain the most value from the herbage in this form.

### 1. — Use or artificially dried green forage crops as cattle feed

The number of pubblications on these forages is enough to give some idea of the importance of the effective utilization of these new products in the maintenance of *milch cows*. The secret of their rational use lies in adjusting their high

protein content to the productivity of the cow. As far as possible, an endeavour is made to use them to replace concentrates. WATSON succeeded in replacing a ration of hay, beets and concentrate with an equal weight of artificially dried grassland herbage without causing any decrease neither in the milk yield and butterfat content nor in the live-weight of the animals. The dried herbage ration was about 4 kg., that is equal to 1/4 of the daily consumption of dry matter. In Denmark, oil-cake and artificially dried grassland herbage were compared. the latter produced an increase in live-weight and, during lactation, a slower decline in milk production. In the United States, tests on high-yielding milch cows showed that in a mixture of fresh alfalfa, alfalfa hay and silage, artificially dried herbage can be included up to 20 per cent.

Particularly important are the experiments in which the complete substitution of concentrates by artificially dried grass has been successfully achieved. PEEL [cited in (49) p. 56] reports having given cows a ration of hay and dried grass only and having obtained up to 33 kg. milk per cow per day. In other tests, during 2 entire winters, up to about 40 kg. milk per cow per day were obtained; these yields were attained by replacing entirely the other concentrate feeds with artificially dried grass Among the many other experiments yielding similar results, mention may be made of the Federal Agricultural Experiment Institution, Liebefeld (Bern), where constnant yields of 20 litres and more of milk per cow per day were obtained by using a ration composed exclusively of hay, artificially dried grass and roots and tubers.

TABLE 36. — *Food in lb. required daily by cows of 10-11 cwt live weight, from the 2nd Report of the Research Council (24), (49).*

| Feedingstuff | Dry cow | Daily yield of cow in gallons | | | | |
|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 |
| Dried grass, best quality . . | — | 4 | 8 | 12 | 16 | 20 |
| Hay . . . . . . . . . . . . | 20 | 20 | 20 | 18 | 14 | 10 |
| Dried grass, medium quality | — | 6 | 12 | 18 | 24 | — |
| Hay . . . . . . . . . . . . | 20 | 17 | 14 | 11 | 8 | — |
| Super-hay . . . . . . . . | — | 20 | 30 | — | — | — |
| Hay . . . . . . . . . . . . | 20 | — | — | — | — | — |

In general, it is agreed that cows of average weight may consume 15-18 kg. of this herbage and meet a nutrient requirement sufficient for a daily production of 32 litres milk. Roughage requirements are covered by straw, if possible of oats or some other spring cereal. Any eventual deficiency in starch equivalents could be met by beets or a mixture of maize and oats. At Jealott's Hill, the following formula is given: 4 kg. artificially dried grass, containing 18 per cent. crude protein, replacing 3.5 kg. concentrates.

TABLE 37. — *Daily forage requirements in lb. per cow weighing* 10-11 *cwt., according to the Imperial Chemical Industries.*

(In artificially dried grass, the protein equivalent = 13 per cent.; the starch equivalent = 60).

| Feedingstuff | Dry cow | Daily yield of cow in gallons 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|
| Dried grass | — | 4 1/4 | 8 1/2 | 13 | 19 | 23 |
| Hay | 40 | 20 | 20 | 18 | 15 | 12 |
| Dried grass | 7 | 11 1/4 | 15 1/2 | 20 | 26 | 30 |
| Oats straw | 13 | 13 | 13 | 13 | 6 | — |
| Dried grass | 4 | 8 1/4 | 12 1/2 | 22 | 22 | 26 |
| Oats straw | 12 | 12 | 12 | 8 | 8 | 6 |
| Forage beets | 25 | 25 | 25 | 25 | 25 | 25 |

During dry seasons, artificially dried grass may be given as a supplement to grazing stock.

In Tables 36, 37 and 38 are given the formulae or suggested rations for the feeding of milch cows using dried grass. The rations are graduated according to daily milk output.

For comparison, the feed chart published by the Imperial Chemical Industries in 1935 is also reproduced (taken from BUCHER) (49).

Lastly, a ration scheme (Table 38) for milch cows, by WATSON (52) is given.

TABLE 38. — *Ration scheme for milch cows,* WATSON (52).

| Milk yield in gallons | Nutrient requirements in lb. Starch equivalent | Nutrient requirements in lb. Protein equivalent | Composition of daily ration in lb. Dried grass Best quality | Dried grass Average quality | Super-hay | Ordinary hay | Nutritive value of ration in lb. Starch equivalent | Nutritive value of ration in lb. Protein equivalent |
|---|---|---|---|---|---|---|---|---|
| 1 | 9.5 | 1.30 | — | — | 15 | 10 | 11.5 | 1.21 |
| 2 | 12.0 | 1.90 | — | 13 | 15 | 15 | 15.9 | 1.89 |
| 3 | 14.5 | 2.50 | — | 30 | — | — | 18.3 | 2.49 |
| 4 | 16.75 | 3.10 | 20 | 10 | — | — | 17.7 | 3.07 |
| 5 | 19.0 | 3.70 | } * 30 | — | — | — | 18.4 | 4.23 |
| 6 | 21.25 | 4.30 | | | | | | |

* Special selected dried grass, containing 20 per cent. protein.

After a few days, the *calves* begin to eat the dried grass, the effect being a more rapid and regular growth, which may be attributed chiefly to the mineral and high vitamin content of the herbage. In the beginning, only the best quality

dried grass should be given; as the animal gains in age and weight, this can be replaced more and more by poorer quality forages (at first by average quality dried grass, subsequently super-hay and lastly ordinary hay). Some idea of the method of forming this feed scheme can be obtained from Table 39, taken from data compiled by WATSON.

TABLE 39. — *Quantity of artificially dried grass to be used in the feeding of young cattle, according to* WATSON (52).

| Live weight in cwt | Daily ration in lb. | | | Starch equivalent in lb | Protein equivalent in lb. |
|---|---|---|---|---|---|
| | Artificially dried grass | | Ordinary hay | | |
| | Best quality | Medium quality | | | |
| 2 . . . . . . . . . | $6\frac{3}{4}$ | | – | 4 | 0 75 |
| 3 . . . . | 6 | 4 | | 6 | 1 00 |
| 4 . . . . . . | 3 | 10 | — | $7\frac{1}{2}$ | 1 16 |
| 5 . . . | - | 16 | | 9 | 1 33 |
| 6 . . . . . . . . | - | 16 | 2 | $9\frac{3}{4}$ | 1 41 |
| 7 . . . . | | 10 | 4 | 10 | 1 45 |
| 8 . . . . . . . | | 16 | 7 | 11 | 1 61 |

Artificially dried grass has given good results in *fattening* cattle and is especially used, although it often occasions protein waste, when the appetite of the animal falls off. This herbage increases carcass weight and improves the quality of the meat. According to age and weight, 4-7 kg. per day without any other addition than straw (in particular, oat straw) are advocated. This ration has brought about daily increases in live-weight of as much as 1 kg.

## 2. — USE OF ARTIFICIALLY DRIED GREEN FORAGES IN THE FEEDING OF PIGS

The use of dried forages is much more complicated for pigs than for cattle.

In so far as the former are concerned, it would naturally be absurd to wish to replace the necessary animal protein by a vegetal protein. Even a plant protein like that in barley, however, could only be substituted in part by a green forage concentrate, because of the high fibre content. As seen from Table 33, the coefficients of digestibility of the crude protein and true protein of artificially dried herbage determined for pigs are relatively low, even when these products are obtained from young plants. Consequently, these forages can only enrich pigs' rations in protein to a very limited extent.

Their low digestibility and higher percentage of roughage give rise to difficulties in the fattening of pigs, all the greater in that it is essential for these animals to have a more digestible feed mixture. It is true that a finer grinding would increase to a certain degree the digestibility of artificially dried herbages for pigs

as has been shown by the experiments of SCHMIDT; nevertheless, as regards these animals, the coefficients of digestibility of the forages in question would always be lower than those determined for ruminants.

TABLE 40. — *Influence of degree of fineness of artificially dried lucerne meal on the digestibility of its components for pigs* [according to SCHMIDT, cited by LANDIS (49)].

| Nutrient | Coefficients of digestibility | |
|---|---|---|
| | of product ground at 1 mm fineness | of product ground at 6 mm fineness |
| Crude protein | 51 75 | 39 61 |
| Fibre | 19 89 | 21 11 |
| N-free extractives | 45 57 | 42 27 |
| Organic matter | 35 63 | 32 19 |

It seems certain, however, that, in fattening pigs, artificially dried grass can be used to substitute in part not only grain meal but also protein aliments. As regards the maximum quantity of this forage which can be given to pigs, investigators differ considerably. As a forage ration for pigs should not contain over 20 per cent. roughage, artificially dried grass is especially suitable as a supplementary ration to easily digestible root crops. According to WOODMAN, about 15 per cent. of the dry matter of the whole ration may consist of artificially dried grass. As admissible limits, WATSON indicates 5 and 15 per cent., he also points out that frequently it has a strong purgative action on pigs. According to RICHTER and EHINGER (55), for fattening, artificially dried forage may be added to very digestible root crops at the rate of 0.5 kg. per pig per day; this quantity may even be increased to 0.75-1 kg. for the more digestible dry fodders (artificially dried beet leaves, grass). It certainly does not cause any appreciable increase in protein, but, however, in this way can be used to substitute part of the grain meal.

The position is more definite as regards the feeding of young stock in general and young pigs in particular.

In raising young stock, the high vitamin content of artificially dried herbage has a very favourable influence and assists in overcoming the many difficulties which arise during the early period of growth, making the use of cod liver oil and other vitamin-containing products unnecessary. WOODMAN advises giving young pigs about 2 per cent. of the dry matter of the whole ration in the form of artificially dried grass.

To breeding animals, especially the sows, which can consume larger quantities of forage, a fairly large supplement may be given. According to WATSON, the ration may contain up to 30 per cent. dried grass; the best quality should be kept for the younger animals, while average quality grass or even super-hay is sufficient for the older ones. By giving to sows in pig and sows suckling their

litter a daily ration of 1 kg. of artificially dried sweet lupin besides the chopped raw beets and the usual concentrate, RICHTER and EHINGER obtained good results with a true protein content estimated at 112 g. in the ration.

### 3. — USE OF ARTIFICIALLY DRIED GREEN FORAGE IN THE FEEDING OF OTHER FARM ANIMALS (HORSES, SHEEP, POULTRY)

In this case much fewer experiments have been made.

In the case of horses, it would be possible to substitute the nutritive value of 1 kg. oats by 1 kg. artificially dried grass of average quality, while the best quality grass could eventually meet a still higher protein requirement 1.15 kg. of this product would have the same nutritive value as 1 kg. beans. For light horses, especially racehorses, it would be a question of replacing a larger quantity of hay by this herbage as, by unit weight, it supplies these animals with a larger amount of nutrients. The addition of this herbage to the ration in breeding-studs is important, as this product favours milk secretion in the mares. As regards draught animals, experiments have chiefly been made on the use of artificially dried beet leaves; the leaves must be washed before drying; a daily ration of 4 kg. is advocated for draught horses. The total daily ration is indicated as 4 kg dried beet leaves, 3-4 kg oats, 1 kg. bran and soybean meal; or else 4-5 kg. beet leaves plus 3.5-4 kg. oats EHINGER (56) gave horses still larger quantities of these leaves, *viz.*. 6 kg., replacing 3 kg. of meadow hay, together with 2 kg. oats and 1 kg sugarbeet cossettes. The horses liked this ration and their working output was not in any way lowered.

With sheep, the position is more or less the same as with cattle; but the profitableness of the feeding plays a decisive role in the use of artificially dried grass for these animals. It may be said, however, that good results are obtained: for example, given as a supplementary ration at the rate of 0.25 0.5 kg. per day, to sheep grazing poor pasture, it had a favourable effect. Pregnant ewes were given 0.5 kg. per day for some time before lambing. The lambs were fed dried grass at an early age and obtained full advantage from its high vitamin content. In fattening sheep, a daily ration of at least 0.25 kg. should be given besides beets, turnip cabbage and hay. RICHTER (57) used dried grass in fattening lambs; towards the end of the period they were receiving 1.5 kg. per head per day. This herbage can be used with equal success as a substitute for hay and feedstuffs rich in very digestible carbohydrates. In these experiments, 110 kg. of artificially dried beet leaves + 40 kg. oat straw could be substituted for 74 kg. hay + 150 kg. potatoes + 22 kg. dried beet cossettes.

In poultry feeds, artificially dried grass can replace all products rich in vitamins and also, to a large extent, cereals. For laying hens and pullets, the feed should contain 25 per cent. dried grass. This has a particularly favourable influence on the colour and development of the egg yolk. According to POLITT [cited in (49), p. 46 *et al.*], very successful results were obtained by using artificially dried grass finely ground in the fowl feed in the proportion of 30 per cent. of the dry weight of the ration.

## Conclusions

From the above review, it may be concluded that artificially dried green forages constitute an important new stockfeed, which can be used to replace in part and sometimes to a very large extent, concentrates. This new product, today especially, is acquiring an increasing importance as it has in comparison with imported concentrate feeds, the triple advantage of being a home product, of standing storage for an almost indefinite time and of not of having any adverse effect on the quality of animal production.

On the other hand, it should be noted that the substitution of a concentrate by artificially dried grass increases the volume of the ration and roughage percentage, which affects the utilization of the total ration. For this reason, a decrease in hay consumption by cows may be expected. If hay, however, is entirely substituted by artificially dried grass, there is much waste with the average grade cow. Moreover, it has yet to be proved, by tests carried out over a long period, whether a ration composed exclusively of dried grass is suitable for these animals.

It is for milch cows that the largest use can be made of this herbage and for which it has the greatest importance. Its high vitamin content presents appreciable advantages in the raising and maintenance of young cattle. In general, it has been observed that, as is the case for fresh grass and pasture, this effect often appears to attain an inexplicable intensity, due to the happy combination of different factors, which can only be obtained in the natural product.

Artificially dried young grass has a high nutritive value and, in this respect, is only slightly inferior to fresh pasture grass. For this reason, therefore, it should be considered more valuable than naturally dried green forages; that this fact should be taken into account in estimating the starch equivalent seems justified.

Other green forages can, it is true, be conserved by artificial drying but under less favourable conditions than is the case for grass and presenting fewer advantages.

## VI.

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## APPENDIX

### New method of accelerating natural drying of grass

In Switzerland, it has been observed that herbage waste given to pigs in small concrete enclosures, dried very rapidly in sunny summer days at the same time maintaining its green colour. This led to experiments on the systematic drying of young grass on terraces exposed to the sun. It was found that a ground covering which strongly reflects the calorific rays, as concrete does, is particularly suitable for rapid drying. In these experiments, the young grass immediately after cutting was spread on sunny terra-

ces at 11 a. m. and turned at 2 p. m. At 4 p. m., it was already dry and in good condition. About 260 kg. of grass were spread over an area of 100 $m^2$ and approximately 70 kg. of hay containing 17 per cent. moisture were obtained. The temperature of the air in the sun did not exceed 26°C.

H J. H.

# BOOK NOTICES*

GRÜNWOLDT, FRANZ. *Répertoire international des périodiques forestiers : Sylviculture, économie du bois, protection de la nature et chasse.* D'après leur état au 1er janvier 1940 Berlin-Wansee, Centre international de Sylviculture, 1940. (Silvae Orbis, No, 1)

The International Forestry Centre of Sylviculture initiates its new monograph series Silvae Orbis with an international survey of forestry periodicals. As Prof. Köstler says in his program on the scope and tasks of this new series, the Centre does not dispose of laboratories or research equipment of its own, but has to base its work mainly on the valorization and the synthesis of published material. Therefore the exhaustive utilization of the specialized periodical press is most important. As in many other domains of scientific work, in forestry also the periodicals are far more important than books It is therefore not to be regarded as a mere coincidence, but as a logical development, when Dr. Grünwoldt, librarian of the Centre presents as a first result of his activity, a fundamental instrument for a prosperous international cooperation in forestry, elaborating with great care and thoroughness an excellent world list of forestry periodicals, which was completely missing up to date. Therefore, this list represents a welcome addition to both forestry and bibliographical literature.

The wealth of material contained in the list is astonishing There is a total of 1254 single periodicals; however, one has to bear in mind that the word periodical has been understood and applied in its widest sense The author includes under this term all publications the nature of which is continuous'. The list contains therefore not only periodicals in the strict sense of the word but also administrative reports, legal collections, bulletins and other series of various kinds. The directory deals also with connected branches of forestry such as utilization of wood, protection of nature and hunting.

The arrangement of the list is geographically, by continents, which are subdivided into countries. The form of the title entries follows Anglo-American cataloguing rules, which undoubtedly suit international lists very well, since they do not list the publications of government agencies, societies, universities and so on under the first word of the title, but under the name of the publishing body, which, as a rule, facilitates the search for the individual titles. However, the application of the Anglo-American rules incidentally involves disadvantages and it may indeed be rather difficult to avoid altogether erroneous interpretations of the rules. Such inconsistencies occurred also in the Directory reviewed, *e. g.*, in the chapter on Latin American countries. But, as the main list of periodical titles, is connected with a list of institutions, from which references are given to the main entries, the few irregularities which an attentive eye may find, are practically without any real importance. Besides, the appendix contains an alphabetical title list which refers to the numbers in the main list and thus excludes any possible doubt.

An excellent new feature, which it is hoped will soon be adopted in similar lists, is the indication of standard abbreviations of the titles of periodicals listed, which have been established for each journal under collaboration of the well known specialist in documentation standardization, Prof. Dr. Prinzhorn, and applying the respective international rules. These short titles are supposed to facilitate and to simplify the bibliograph-

* Under this heading are included short synopses of books received for review.

ical citation of periodical literature. This particular feature shows that the Forestry Centre fully realizes that one of the most important tasks of any international organization consists in promoting standardization in the intellectuale sphere.

The other data for the single periodicals refer to the issuing body, the editor's address, the publisher's, editor's or printer's name, the date of foundation, the frequency of publication, the size, price and eventual changes in titles. The main list, which, is arranged by countries, is supplemented by the alphabetical title index mentioned above, by a list of geographical names, a subject list and an index by the various forms of serials (yearbooks, reports, periodicals, series, etc ). These supplements undoubtedly increase considerably the usefulness of this new directory which may be regarded as a fundamental basis for all forestry documentation work]

S v. F.

Prof. UGO PAPI, *Segretario generale dell'Istituto, Direttore responsabile.*

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# MONTHLY BULLETIN

OF

# AGRICULTURAL SCIENCE AND PRACTICE


## PLANT IMPROVEMENT THROUGH HETEROSIS


by Dr. N. von Gescher



*In the United States, corn or maize growing benefits considerably through the phenomenon known as heterosis or hybrid vigour. The widespread use of hybrid seed has contributed considerably towards higher yields with the result that this crop now plays a very important part in both private and public economy.*

*With a view to replying to the many queries on the subject addressed to the International Institute of Agriculture, in this article the cause and effect of heterosis are discussed as also the problem of its practical utilization for animal and plant production.*

*The hybridization of maize in the United States is treated in detail and the utilization of the experiments made is warmly recommended in other countries.*

*Directions are also given on a simplified process which could be adopted in maize-growing areas with a view to leading up to the more intricate American methods.*


### Introductory

The term 'heterosis' is of recent date, but designates a phenomenon known for some very considerable time and is a very ancient element of improvement utilized unconsciously in practice.

D. F. Jones, to whom the first fundamental research work in this field is due (1917), designates under this term a productive force exceeding that of the parent plants, which is often found in the 1st generation ($F_1$) of a crossing between 2 individual plants not closely related.

The increase in production over that of the parent plants, in itself, is not a phenomenon. It can occur as a transgression in any ordinary hereditary process and constitutes the object of all selection work. Hybrid vigour has somewhat the character of a stimulation which at the same time would implicate the fact that this phenomenon cannot be transmitted hereditarily. The increased vigour of the plant is due to hybridization, that is to say, to the union of genetically heterogenous elements. This does not mean to say, however, that every crossing entails the effect of hybrid vigour. The preliminary condition is rather a need for partial renovation of the hereditary patrimony. Hybrid vigour can best be expected after a series of generations of inbreeding. Hybrid vigour and inbreeding cannot be considered separately, Expressed in simple words, although not entirely explaining the phenomenon, hybrid vigour is the disappearance of the degeneration caused by inbreeding, resulting after one crossing of the product of inbreeding with a parent plant which differs more or less by its heredi-

tary characters, with the result that the initial yield level may again be attained or even exceeded. In the wide sense of the term, however, hybrid vigour may also designate, in a general way, increased vigour that is to say, the increased vitality, which is frequently the outcome of hybridization. These approximate definitions of hybrid vigour, however, do not give any indication of the nature itself of the phenomenon. In fact, up to the present, it has not yet been satisfactorily explained.

## History of research work on hybrid vigour.

Research work on hybrid vigour is closely bound up with the development of maize (in America, corn) selection in the United States. In 1905, G. A SHULL (at Cold Spring Harbour, New York State) and E M. EAST (Experiment Station of the Illinois Agricultural College) began investigations on the effect of hybrid vigour in maize and on the improvement of this plant by the following means (*a*) creation of different lines by inbreeding—(*b*) determination of the best crosses between these lines—(*c*) utilization of the best crossing for seed. In 1908, the Federal Department of Agriculture started work on maize improvement by heterosis, under the direction of G N. COLLINS.

Subsequently, all the agricultural experiment stations in the corn belt took up the study and application of the new process of improving this crop. In 1913, H. A. WALLACE (Des Moines, Iowa State) asserted himself as the first private plant breeder In 1922, in his capacity as Chief of the Cereals Division in the Bureau of Plant Industry of the aforesaid Federal Department, F. D. RICHEY organized the collaboration of the various agricultural experiment stations. A special committee was established for maize improvement, which drew up a plan for uniform work, providing for the exchange of observations and selection material.

There was naturally the temptation to consider hybrid vigour as a direct result of heterozygosis in contrast to the homozygous character of the lines produced from inbreeding. This is why, in publishing in 1912 the first detailed work on this subject, EAST and HAYES adopted the term heterozygosis. Afterwards, however, this name only lasted as long as the concept which was its basis. In 1917, the term ' heterosis ' was adopted, now generally employed, and subsequently replaced in English-speaking countries and, in particular, in the United States, by the expression ' hybrid vigour '.

According to EAST, the difference between the corresponding genes stimulates the growth processes, especially cell division. In this way, increase in yield and its subsequent decrease would be easily explained; but if the theory of EAST is true, according to the Mendelian concept of heredity, in the following generations, a segregation of higher yielding plants should undoubtedly be expected. In practice, however, this does not happen as a rule, besides it cannot be held that heterozygous specimens are always more productive that homozygous subjects.

These considerations led JONES to ascertain the cause of the increased yield of the hybrid product not in a stimulation, but in the cessation of a phenomenon of inhibition.

This latter would be due to the increase in recessive factors resulting from inbreeding and would be annulled by the adjunction of dominant factors. This concept explains very well the effect of hybrid vigour in the first hybrid generation and its decline in subsequent generations. In this case also, an ulterior segregation of high-yielding variants should be expected. It is true that, with the increase in number of factors, these latter would be very rare and practically imperceptible. As is known, productivity is dependent on many factors.

The rapid decrease of the effect of hybrid vigour in the subsequent generations and the absence of segregation of variants showing this effect anew, thanks to a favowrable combination of genes, seem, at the first onset, to dispel the hypothesis of a cumulative gene action as the explication of hybrid vigour. But careful investigations, which cannot be discussed in detail here, led KAPPERT (1930) to consider it probable, that in maize, hybrid vigour is, nevertheless the more or less complex result of a cumulative effect of different factors. There would be reason to draw the conclusion, important in plant breeding, that the productivity of the hybrid generation may be maintained and fixed through appropriate measures.

The explication of the causes of hybrid vigour is of eminent practical importance to the breeder for the plan and execution of his work. it is by no means immaterial that heterosis depends simply on heterozygosis or that it results from a happy combination of factors, or else that it is due to the action of inhibitory factors or again that lethal factors come into play, etc. Even if the final explanation should reveal the existence of complicated processes (as seems to be the case), all knowledge acquired on the subject of hybrid vigour has an important practical value.

Quite recently (1940), the investigations of Fr. OEHLKERS, regarding the classic subject of the species of *Oenothera*, have thrown further light on the problem. This scientist was able to ascertain in these plants, two different effects of heterosis: (*a*) an increase in growth vigour - (*b*) greater aptitude of the seedlings to form adventitious roots. These two effects are not parallel, but independent of each other. In this case, evidently two distinct causes of heterosis phenomena have to be admitted. Interesting fact to note, these investigations showed that the same heterosis phenomena were caused, on the one hand by a crossing between different species and, on the other, by polyploidy. A parallelism between these two causes results, which would make it possible to attribute to hybrid vigour a role in the evolution of species, similar to the role recently attributed, in this field, to polyploidy.

## Heterosis in the animal kingdom

Although up to the present, heterosis has not yet received a complete scientific explanation, nevertheless from time immemorial, it has found a practical application in agriculture. The earliest examples are to be found in animal husbandry.

On considering hybrid vigour, in the widest sense of the term, simply as an increase in productivity and growth vigour, due to cross-breeding, mention should

be made, as a first example, of the *mule* which, for its diverse abilities, surpasses the average output of its parents: mare and jack. It also shows the tendency to judge hybrid vigour from the anthropocentric viewpoint, as, in general, hybrid vigour is only spoken of, when the appearance or improvement of an aptitude or characteristic useful to man is observed. In this aspect, as heterosis phenomena, the sobriety and strength of the mule are considered superior to those of the horse and the ass. From the scientific viewpoint, however, heterosis may regard all fields and all characteristics, consequently also those which do not interest man from the practical standpoint.

In *pig* breeding, considerable advantage is taken of the exuberance which characterizes the growth of $F_1$ animals. The success obtained from a Berkshire × Landrace pig cross for fattening not, naturally, for breeding, is well known.

In Japan, *silkworm* breeding is largely based on hybrids.

The investigations and experiments of L. C. DUNN on *poultry* have contributed towards elucidating the problem of hybrid wigour. The crossing of inbred animals from different stocks resulted in a large increase in percentage of hatchings. The result varied according to the parent stock employed, so that it was possible to establish the specific genetic differences of stocks in relation to the effect of heterosis, similar to those observed by A. NILSSON in the plant kingdom (with rye) DUNN concluded that poultry react to prolonged imbreeding followed by crossing in the same way as maize, and that the successful results obtained show that an improvement may be attained with the application of heterosis to poultry. Therefore, a method of breeding which has given excellent results in the plant kingdom, could also be employed for animals

## Heterosis in the plant kingdom

In plants, hybrid vigour is quite a general problem, but of which the bearing has often not been understood. It appears in making crossings between different genera, between different species, within a species and also between artificially self fertilized lines of naturally allogamous species. As a rule no conclusion can be drawn from the degree of relationship of the parent plants used in the crossing as regards the heterotic effect which may be expected Only the maximum and minimum limits are fairly definite by the fact that, on the one hand, a certain difference between the genotypes is a preliminary condition for hybrid vigour but that, on the other hand, too marked a difference causes injury, which may lead to complete incapacity to live; these phenomena, however, may also occur under the action of lethal factors, in cross-breds of similar forms. Under these conditions, a heterotic effect, which perhaps could be expected from the genes, cannot naturally take place; it is there and then made impossible, masked or deformed.

Crossing systematically distant forms (species, genera) often leads to continued vegetative growth and generative sterility. In this case, if the vegetative development appears desirable from the economic standpoint, one may well speak of hybrid vigour, in the contrary case, one should logically speak of negative heterosis. This example also shows how inopportune it is to consider practical utility as the pivot of the question under study.

In fact, as the theory anticipates, hybrid vigour may affect all parts of the plant and concern all biological phenomena The cases most frequently observed are those of an advantageous effect on utilitarian characters; generally manifested by an increase in the size of the whole plant (vegetative luxuriance), but which may also consist in a multiplication of certain parts, as, for example, a more abundant leaf or flower formation

In the field of physiology, the results of hybrid vigour have often been an acceleration or also a delay in flowering and maturity (MALINOWSKI) and also an increase in regeneration capacity

The question of the anatomatical cause of vegetative luxuriance has not yet been definitely cleared up

From extensive studies, KIESSELBACH considers heterosis phenomena as being due to an increase in the number of cells and, at the same time, in their volume The increase in the size of the plants, which he determined in the $F_1$ of crossings between maize lines, differed considerably from one organ to another. On the whole, he blieves that 90 per cent. of the increase in volume of the plants can be attributed to an increase in the number of cells and 10 per cent to increase in the volume of the latter

It is known that vegetative luxuriance occurs chiefly in crossings between genetically distant forms (different species and genera, for example) and that it generally entails, as negative counterpart, generative weakness or even complete sterility This observation, however, should not be considered as a strict rule

In crossings of pure lines, on the one hand, vegetative luxuriance has been formed and, on the other, sterility (MALINOWSKI)

The heterotic effect is independent of the phase of development of the plant, It may take place at any moment, even in the embryo of the seed In his very extensive investigations on the nature and importance of hybrid vigour, ASBY (1930) had found that the enlargement of the embryo is a typical indication This finding, subsequently held unfounded, was recently confirmed by MURDOCH (1940) The advantage that the plant possesses at the embryo stage afterwards continues throughout the course of its development

If no essential differences are seen between the cross of closely related forms and that of unrelated forms, the conditions of degeneration and disturbance which arise as a result of crossings between forms having the most varied degrees of relationship should be considered as a negative heterosis effect Thus, for example, KOSTOFF has often found, in tobacco hybrids, a shortening of the embryo, contrary to the finding of ASBY for maize

## Practical utilization of heterosis

### (A) Maize

This utilization is applied chiefly for maize breeding. As is known, this plant is monoecious. The male inflorescences are panicles placed at the top of the stems, while the female inflorescences (which subsequently form the ears) are placed lower down. Maize is an allogamous plant, strictly anemophylous.

Artificial selfing causes degeneration phenomena which augment from generation to generation when repeated, until, about the 6th generation, degeneration is fixed at a certain level. These facts hinder considerably the plant breeder who, to obtain constant homozygous types, is obliged to adopt the practice of selfing or at least crossing between very closely related individuals. It is very important for him to know that not only the degenerative changes produced through inbreeding are completely annuled by a single crossing, but also that the hybrid may attain a level surpassing the average value of the levels of the parent plants. In this way, the maize breeder finds a way open to utilize inbreeding without any apprehension, which is a great advantage. Inbreeding, however, is not an aim in itself, the true aim is rather to produce lines truly transmitting their characteristics, because they are homozygous. With inbreeding, the uniformity of the lines augments constantly: after 5-6 generations, it is practically complete. Moreover, inbreeding eliminates undesirable elements as they are not viable. It is in the first generation that the decline in vigour is greatest; in the subsequent generations it is relatively small In maize, as regards yield, decline may amount to about 50 per cent. of the level of the lines of the parent plants before beginning inbreeding.

A description is here given of the process of producing maize hybrids that T. V. ZAPPAROLI (Stazione sperimentale di Maiscoltura at Bergamo, Italy) has elaborated for the assistance of growers The author proposes a simplified method, recurring to the preliminary formation of inbred lines

With a view to increasing as much as possible the effect of heterosis, two very different types, though both flowering about the same time, are selected for crossing

To avoid undesirable crosses, sowing is carried out at least 8-10 days earlier than in the nearby maize fields. For the male parent, the variety chiefly cultivated in the region should be chosen

The seed of varieties chosen for the male and female parents are sown respectively in rows or in pairs of alternate rows. One row of the male can be alternated with two rows of the female parent, if it is certain that the former produces an abundant supply of pollen.

Both in the field and on the plan, the name of the variety employed in each row must be indicated in each row. Row spacing and cultivation care should conform to the local system.

The plants should be carefully watched during the course of their development, in order to remove the male inflorescences from all the plants chosen as female parents, as soon and as long as they appear. This work usually lasts a week.

The removal of these inflorescences (detasseling) is effected by simple topping, by pulling out or cutting of the panicles. Care should be taken to carry out this operation before the anthers open and are able to liberate the pollen.

On harvesting, naturally the ears of the detasseled plants should be collected separately, eliminating those which are badly formed and which do not correspond to the desired type. Also, before shelling, the base and the tip of each ear must be removed.

The seed thus furnished by the female parent plant results from a cross of the two varieties employed.

The ears of the plants which were not detasseled may naturally supply, for another crop, pure seed of the type employed as male parent.

If the production of hybrid seed is effected on two fields fairly distant from each other, using on one, as male parent, the variety serving as female parent on the other, and vice versa, one obtains, besides the hybrid seed obtained from the two reciprocal and equivalent crosses, the seed of the two parents again in the pure state and ready for use in the following year

Hybrid seed is used for the usual crop growing. Owing to the effect of hybrid vigour, it surpasses the yield capacity of the parents by about 25 per cent. on an average.

However, this increase in output only occurs in the first crop, and less, or even not at all in an eventual subsequent crop, which should not be attempted. Consequently, hybrid seed of this type has to be produced anew each year, which implies not ordinary multiplication work but selection work requiring an extensive knowledge of the question and justifying its cost.

It is necessary to be particularly attentive during the flowering season Its duration may last for a more or less short period, as the plants do not all flower at the same time. The flowering of the panicles (tassels) lasting 8-12 days, it is necessary, during this period, to go through the field, row by row, each day to remove them from the plants serving as female parents.

The female inflorescences usually flower a little later than the panicles. The styles take about a week to fully develop. The stigmas remain receptive to fertilization for 2 weeks and even more and it is during this period that crossing should take place with the pollen from the variety selected as male parent

When flowering is at its height, an expert worker can, in a working day of 8 hours, remove the panicles in an area of 1-1.5 ha , at the beginning and end of flowering, it is much more. Allowing that an operator only covers 1 ha. per day, and that he repeats this work 12 times, paid 12 lire per day, ZAPPAROLI estimates cost of topping at 144 lire per ha. This sum could also cover other special expenses incurred in the production of hybrid seed (more difficult sowing, increased harvesting costs, etc.). But only the detasseled rows (generally only half the field ) furnish the required hybrid seed. Allowing for a yield of only 30 qls. per hectare, there would only be 15 qls. of the hybrid seed. Moreover, counting a loss of 3 qls. in shelling and sorting, only 12 qls. of seed remain, so that, for each quintal, there are 144 : 12 = 12 lire extra costs. This expenditure, however, is very low in relation to the increased harvest which this hybrid seed will produce. To recover expenses, however, the process has to be applied judiciously. Anyone making his first attempt at maize improvement should be careful to chose, for crossing, the varieties which have already proved succesful in the region considered for cultivation.

The process described above supposes that common varieties, improved or otherwise are used for crossbreeding. The work is more difficult and longer, but also more promising if, in place of these types, use is made of inbred lines, especially created for crossing and carefully tested, as is the practice in the United States.

I. — HYBRID MAIZE IN THE UNITED STATES

In the theory and practice of maize breeding, the United States surpasses all other countries. As their maize production amounts to 3/4 of the world output, this plant characterizes their agriculture and is of fundamental importance. It is not surprising, therefore, that the improvement of maize through heterosis has been and is still being attentively studied and widely developed. The practical results obtained have been outstanding; the production of hybrid corn has made great progress. Unfortunately, many dealing with hybrid maize were not always thoroughly honest in the matter. Advertisements and popular publications were sometimes ambiguous. It is just, therefore, to give a disinterested survey of this question to oppose the exaggerated publicity claims and inaccurate explications of certain publications and, on the other hand, to put into its true light, maize improvement through heterosis, with its enormous importance for world agriculture.

The maize hybrid has often been compared with the mule. In fact, just as the mule is the first generation hybrid between the mare and the ass, a maize hybrid is the first generation hybrid between two strains of maize; in the same way as the mule this maize hybrid is only of value in the first generation as a crop and is not suitable for reproduction. Good maize hybrids surpass any other type of this cereal. However, neither all mules nor all maize hybrids are efficient

According to the definition of hybrid maize laid down in several States of the Union for its legal protection, by this term is intended ' the first generation of a cross between strains involving inbred lines'.

Already soon after 1870, W. I. BEAL (Michigan Agricultural College) carried out hybridization work on maize, with the evident intention of utilizing hybrid vigour to increase production. After 1890, a suggestion was made to the farmers to produce their own crossed seed, but without result. In 1905, A. D. SHAMEL success fully crossed inbred lines, after which G. H. SHULL (1908), E M. EAST (1909) and G. M. COLLINS (1910) renewed recommendations to the farmers regarding hybrid maize: The basis for the subsequent development of maize improvement had thus been laid. The first hybrid involving inbred lines to be produced commercially was the Burr-Leaming double cross, developed by the Connecticut Agricultural Experiment Station in 1917. In 1921, GEORGE CARTER (Clinton, Conn.) used the first commercial crossing field for the production of hybrid seed, for producing crossed seed of Burr-Leaming; the following year the crop was sold at 8 dollars a bushel.

It was said earlier on in the article that inbreeding serves to eliminate the undesirable characters and to put the desirable characters into homozygous form so as to obtain uniform types, truly transmitting their characters and properties. Therefore, taking into account the heterosis effect which may be expected as a result of crossing two inbred lines, the consequences of degeneration are also accepted. These lines, therefore, as in other improvement processes, are closely examined for resistance to lodging, resistance to drought and diseases, ear shape,

seed colour, etc. Experience has shown fortunately that, in general, inbred lines transmit, also to the products of crossing, the characters they manifested in the course of inbreeding. The lines relatively the most productive therefore, generally give the most productive hybrids. No less fortunate is the recent finding that, in relation to the character 'productivity', the said lines attain a remarkable constancy from the 2nd and 3rd inbred generation. From the 3rd generation, onwards, little change takes place. Of decisive importance is the choice of parents, as each inbred line does not give a good result with each other; the result depends rather on the individual disposition of the 2 parents and their reciprocal influence. But here there are conditions whose mode of action still completely escapes our understanding. Therefore, tests have to be carried out perforce. It is necessary to determine systematically the value of inbred lines, crossing all, by pairs, one with the other. The road is long and difficult, making the process more costly. Fortunately, however, it has been possible to simplify testing methods All the lines are crossed with one other selected as male parent (generally a tested selected variety) which serves as tester. The better lines selected from these preliminary comparisons are subjected to a further testing. This is the basis of the testing process There are several modifications elaborated by private breeders, which unfortunately are considered as trade secrets. The testing process, therefore resembles, in its fundamental traits, the well known indirect method employed in animal husbandry to determine the genetic value of bulls (bull indices) *

After having determined the suitability for using of an inbred line, the seed which manifests the heterosis effect is produced for current use. The following crosses are distinguished:

- (*a*) top cross, immediate result of testing inbred lines, *i. e.*, the progeny of a cross between an inbred line and an approved variety;
- (*b*) single cross, crossing between 2 inbred lines ($A \times B$);
- (*c*) three-way cross, or cross between a tested $F_1$ generation (for example, $A \times B$) with a suitable inbred line [$(A \times B) \times C$];
- (*d*) double-cross, cross of 2 good $F_1$ generations to obtain a new $F_1$ [$(A \times B) \times (C \times D)$].

There are also modifications of these systems of crossing and still more complicated combinations.

In general, the top cross and the single cross cannot compete with other cross types. New hybrids so simply obtained give sufficiently good results to furnish a commercial seed which can stand up to competition. The greater part of commercial seed is double-cross seed. In fact, it has been found that double-crossing augments hybrid vigour appreciably, even when the first cross shows no sign of it, with double crosses JONES and MENGELSDORF obtained a yield exceeding that of the most productive parent by 47 per cent., while the yield from simple crosses was only slightly above that of the parents. Double cross seed gives rise as is easily understood to populations of a more or less un-

* In this respect, see: S. TAUSSIG, The problem of proving dairy bulls. *Monthly Bulletin of Agricultural Science and Practice*, 1937, No. 3.

equal composition, which, in general, is not a disadvantage, but assures, on the contrary, the advantage of easy adaptation to environmental and cultivation conditions. The chief advantage of double crosses, however, is their lower cost, as the seed is obtained through the combination of two single crosses which already have a normal production, while to obtain the seed of single crosses, one has to begin with inbred lines having a reduced yield owing to the degenerative symptoms mentioned above.

A good idea of hybrid vigour maize production can be obtained by examining the results of the corn yield tests in the different States of the corn belt and published, in part, each year, and, in part, at longer intervals. Detailed reports of this type are issued in the States of Missouri, Iowa, Illinois, etc. A particularly instructive review of these results is given in the report of U. S. ZUBER and J. L. ROBINSON (Iowa State College of Agriculture at Ames), published in 1938, which summarizes the results of several years and in twelve districts of Iowa State. For example, during the period 1926-1938, the situation was as follows: taking the average of all the tests, the crop obtained from hybrid seed was about 13 per cent more than that obtained from the varieties used in comparison. This increase varied between 6.8 per cent. (in 1927) and 30.8 per cent. (in 1936). Compared with the varieties, the hybrid seed placed in commerce furnished increases in yield up to 35 per cent. and showed its value particularly in years of severe drought.

A similar picture of the situation is seen in the reports of other States, Illinois, for example. From the results of a 5-year experiment carried out in common on 10 experiment fields of this State, the 5 best hybrids exceeded in yield the 5 best ordinary varieties with which they were compared, on an average by 17.5 per cent. The hybrids were definitely superior particularly as regards resistance to lodging

Illinois is the true home of the maize hybrid. It is here that the first success was obtained (EAST, 1905) and it is here (at El Paso) that the selection establishment of Lester PFISTER is found, who, being one of the first private breeders in this respect has profited from the advantages of the initial success and thus made a sensation throughout the world. It is from here that hybrid maize made its entry into the agricultural press under names such as 'Wonder Corn' and similar appellations.

Today, Illinois is still the home of private breeders — besides Lester PFISTER, B. E. MOEWS, FUNK, Pioneer Company, etc.

**As indicated at the beginning of the article, the Federal Department of Agriculture has taken in hand the central direction of maize hybrid improvement and has connected the agricultural experiment stations of the States concerned, with the organization of the work carried out in common. In this way, the Department aims at placing in competent hands and at developing systematically the production of inbred lines. In this respect, studies are still in the opening stage.. In particular, special varieties for the different regions are still wanting.**

A review by M. T. JENKINS, published in 1936 and without doubt already a little out of date, gives the following results obtained in this field by the agricultural experiment stations at the head of this movement:

| Experiment Stations | Type and number of crossings | Area under these hybrids in the U.S |
|---|---|---|
| Iowa Agricultural Experiment Station (Ames) | Double-cross 4 | 88 000 acres |
| Minnesota Agricultural Experiment Station (St Paul) | Three-way cross, 1<br>Double-cross 2 | 61 000 ,, |
| Illinois Agricultural Experiment Station (Bloomington) | Three-way cross 3<br>Double-cross, 2 | 24 000 |
| Wisconsin Agricultural Experiment Station (Madison) | Three-way cross, 6<br>Double-cross, 13 | 11 500 ,, |

In 1935, the most popular maize hybrid was Iowa Hybrid 942, cultivated over 42,000 acres; with a yield 19 per cent higher than that of the varieties with which it was compared, it was also one of the most productive. In this respect, Wisconsin Hybrid 604 topped the list with an increase in yield attaining 30 per cent But these results of one year only have little importance as it should be noted that the production of hybrids develops constantly and tends to increase. The new selections supplant the preceding because they are better and more certain to succeed This is an evident sign of progress.

The first association for hybrid seed production was established in 1926; in 1932, several others had sprung up and since then, their number is increasing constantly In 1936, 44 hybrids, evolved by 12 experiment stations, had been placed in commerce.

In 1938, in Illinois State alone, 8.4 million acres were sown with hybrid seed. In some parts of this State, hybrid maize covered 80-90 per cent of the total area under this cereal. According to WALLACE, in 1938 throughout the United States, at least 15 million acres were sown with hybrid maize, and the increase in yield obtained may be estimated at approximately 100 million bushels.

In experiment stations, variety tests are usually carried out under a secret number which remains so until harvesting. When these tests are made on varieties produced by private breeders, the seed is taken from the trade and not from the breeders themselves. In this way, an impartial judgement is guaranteed. In many cases, competitions are organized. Thus, Iowa States awards the Banner Trophy to the variety giving the best performance. In 1938, it was awarded to Pioneer Hi-Breed 349 for a yield which surpassed by 18.4 per cent. the average yield of competing varieties, and by 34.5 per cent. that of the open-pollinated entries.

Surprisingly, the success of the best varieties is fairly limited both as regards period of popularity and area. In Illinois, for example, the PFISTER varieties, formerly so renowned were soon eclipsed by the hybrids of MOEWS, FUNK, Pioneer Company, etc. Hybrids are only successful in certain localities, each being

adapted to special determined conditions like other varieties. In general, however, it is in good, not mediocre soil that hybrids show their superiority to open-pollinated varieties. Under unfavourable conditions, they hardly cover the ontlay. All American experiment stations continually emphasize that the different hybrids are not all the same and that their value must be tested the same as other varieties. The only hybrids which can definitely considered good are those recommended by the respective experiment Station for a given region.

To guarantee in practice, protection as far as possible, the certification of seed, with adaptation to the special conditions of each region, has been applied to hybrid varieties. The Missouri Corn Growers' Association, for example, has drawn up opportune regulations on the matter. These regulations require that double-cross seed must be produced exclusively from tested and approved inbred lines. The minimum distance which must isolate the crossing plot from other maize is also prescribed. Detasseling must be done carefully enough to ensure that never more than one-half of one per cent. of the mother plants are shedding pollen during the detasseling period At least three inspections — two field and one crib — are made before the corn is processed.

As the farmer has to procure fresh hybrid seed each year, trade in seed and breeding stations are very important. The possibilities of fraudulency are so evident that an official control of the seed is absolutely indispensable : It should be exercized by the agricultural experiment stations which, in general, have already taken in hand the seed testing and approval service.

In Iowa State, to be certified a hybrid must have yielded at least 10 per cent. more than the average of the open-pollinated varieties in a specific section for 2 years out of the 5 years immediately preceding the year of certification Besides field and crib inspections, germination tests are also anticipated.

In view of the considerable importance of maize hybrid production and utilization legislative measures have been taken. In the States of Iowa and South Dakota, laws relative to the question have been in force for several years. In Illinois, Ohio and Wisconsin, ordinances define the term hybrid corn and its legal protection.

The question may be raised as to whether it would not be better to entrust the production of inbred lines to official breeding establishments, leaving the production of commercial seed to private breeders. In Nebraska, this system is already being followed as private breeders prefer to procure the necessary inbred lines from the agricultural experiment stations. In this case, it is naturally difficult to fix the price. In 1936, the College of Agriculture at Lincoln (Nebraska) supplied inbred lines at 1.5 dollars per lb. It is also rather difficult to fix an adequate price for the commercial hybrid seed obtained.

Emphasis may again be made of the fact that the yields of hybrids vary according to weather conditions and local environment. According to KIESSELBACH, however, it may be conceded that, in the entire maize area in the United States, the use of hybrids procures an average increase in yield of 15 per cent. Taking into account that 1 bushel of seed costing 7 dollars is needed to sow about

7 acres, seed costs are therefore 1 dollar per acre. The ordinary maize varieties producing 42 bushels of seed per acre, with a surplus yield of 15 per cent., the hybrid varieties may produce 49 bushels. The result is that each dollar spent in buying hybrid seed may procure 7 bushels of seed more than would have been the case with ordinary seed.

A calculation of this kind evidently leads to both the use and production of hybrid seed. In fact these two operations have become very extensive in recent years. From 1936, the experiment stations of 33 States of the Union and many private breeders were already endeavouring to produce guaranteed hybrid seed.

To accelerate the production of inbred lines, in the frost-free zones of Florida and Argentina, it was found possible to obtain 2 generations per year by raising crops in the greenhouse using electric lights to lengthen the daylight period. This shows the degree of perfection abready attained in the United States with this method of improvement; it also shows, however, that the production of really good hybrids is neither easy nor unrestrictedly lucrative. In fact, inbreeding is both expensive and difficult; LIEBER sums up the difficulties as follows: (*a*) for years artificial selfing has to be carried out on a large scale — (*b*) only some of the selfed lines show the desired degree of hybrid vigour and may be used to advantage — (*c*) selfed lines usually are not very productive — (*d*) for large scale propagation all allogamy has to be excluded, necessitating a larger field area — (*e*) admitting that selfing has to be carried out 5 years in sequence, it is only at the end of 8 years that the seed can be sold commercially.

All these difficulties, however, only concern the breeder and give him the right to demand a high price for the seed he supplies. On the other hand, practical agriculture benefits from all the advantages which the use of hybrid seed procures. In the first place, account must be taken of the increase in yield: at the rate of 15 per cent., as mentioned above, which represents an average for both years and regions, it is evaluated very low; but, turning all possibilities to account, in some districts the increase may amount to 30 and even 45 per cent. Moreover, the use of hybrid seed ensures the advantage of greater resistance to lodging and consequently, a more regular production; resistance to drought is also augmented, as has already been mentioned. To these advantages may be added the improved quality of the seed which is also more even as the ears are better shaped. Earless plants are fewer in hybrid maize than in the ordinary varieties.

Despite the considerable progress made in this field in the United States, the work so far accomplished only represents the first efforts and, as M. T. JENKINS states: 'There is every reason to believe that greater progress will be made in corn improvement in the next 25 or 50 years than has been made since the crop came into the possession of the white man nearly 450 years ago'.

## 2. — HYBRID MAIZE IN OTHER COUNTRIES

In view of the extraordinary success obtained with maize hybridization in the United States, it is surprising that up to the present, so little use has been made of this process. In some intensive maize-growing regions, however, it is beginning to be employed.

After the United States, China is the largest producer with an annual average of 60 million quintals. Among other non-European large producers come, in decreasing order of importance British India (about 22 million qls.), Manchukuo (about 20 million qls.), Mexico (about 18 million qls.). These countries give no information on the systematic production of maize hybrids. The same may be said of the European country which up to date produced the most maize: Rumania (about 46 million qls. before surrender of territory).

In Yugoslavia, which, with an annual production of about 30 million qls., follows immediately after Rumania, A. TAVČAR has carried out important work on maize improvement by hybrid vigour. The best results were obtained with the $F_1$ of a cross between the Croatian 8-rowed maize (*Zea Mays indurata*) and the Hungarian dent maize (*Z. M. indentata*). The yield of the best hybrids was about 54 per cent higher than that of the variety with which it was compared.

In Italy (22-30 million qls.) careful attention is given to the cultivation of maize resulting in a relatively high unit yield (about 20 qls. per ha., average for many years). The improvement of this cereal is being particularly studied. Hybrid production is not as yet being carried out on the American model, but the 'Stazione sperimentale di Maiscoltura' at Bergamo, doing away with the preliminary selection of inbred lines and practising instead simple crosses between different varieties, is endeavouring to introduce into practice the simplified process of producing maize hybrids which has already been described (See p. 286).

According to a communication of Prof. T. V. ZAPPAROLI, Director of the aforesaid experiment station, he obtained in experiments, by a single crossing of suitable varieties, an effect of heterosis manifesting itself by increases in yield between 29 and 48 per cent.

Despite the eloquence of these results and the propaganda in favour of the production and use of hybrid seed in practice, the process in question has not obtained the diffusion it merits, chiefly for the following motives.

(*a*) difficulty in selecting suitable parents among the multiple varieties of a given region;

(*b*) impossibility, due to certain causes, of organizing special establishments for large scale production and sale of hybrid seed;

(*c*) difficulty of getting a farmer to repeat the production of hybrid seed each year and, in anticipation of further success, taking upon himself supplementary work requiring a certain intelligence, much attention and patience, precisely at the moment when there is other pressing work to do on the farm.

Experiments, undertaken with enthusiasm, are often abandoned at the end of a few years.

In Hungary, before the recent addition in territory, maize cultivation, with 1.1 million hectares, covered about 21 per cent. of the total arable area. The attention given to improvement of maize corresponds to its importance in the economy of the country. Unfortunately, the maize fields are situated so closely together, that it is very difficult to obtain isolated plots necessary for the production of hybrid maize.

At the Kompolt Breeding Station, R. FLEISCHMANN has carried ont extensive experiments on the simple crossing of different varieties such as is practised in Italy, as the first step towards the improvement of maize by heterosis.

The best combination obtained to date produced a yield 32 per cent. higher than the average yield of the two parents. A remarkable advance was the early maturity of the hybrids which assures the possibility of extending maize cultivation further north.

As a rule, the hybrids of 2 selected very productive varieties gave higher yields than hybrids of the ordinary varieties of the country. In 1938, in the State property at Mezőhegyes, the maize hybrid was cultivated on about 400 ha.; it produced an average of 69.5 qls. ears per ha., while the ordinary variety with which it was compared only yielded 61.4 qls. A large scale experiment, very accurately carried out, gave more or less the same proportion in yields. The effect of hybrid vigour was more evident in the vegetative development than in the reproductory organs; this could be turned to account in the production of maize for ensilage. For this reason Hungarian farmers turn more to this aspect of the utilization of the maize hybrid.

For many years already, in former Austria, F. FRIMMEL has placed on the market seed of the 'Feldsberger Heterosismais' which represents the $F_1$ of a breed cross.

In the entire U. S. S. R., maize covers about 37 million hectares, and in some places, cultivation is extensive.

In 1939, V. P. KYBISON described the beginning of the production of inbred lines, which dates back to 1931, and the first crossing experiments between these lines, carried out in 1935. It appears that the best simple cross increased yield by 51 per cent. and the best double cross by 41 per cent.

A simple cross of varieties, without preliminary inbreeding, was successfully carried out at a kolkhoz on an area of 548 ha.

The rare information obtained on maize improvement by hybrid vigour in countries other than America show that the rest of the world has only tentatively and hesitatingly followed the example of the United States.

### (B) Plants other than maize

With these plants conditions are quite different. It should be understood at the beginning that improvement by hybrid vigour does not produce the same practical results as with maize.

The rye called 'Maultier-Roggen' (lit. mule rye) furnishes the oldest example of a systematic utilization of hybrid vigour, with this peculiarity that, with this plant, a different method has to be used, as its small hermaphrodite anemophile flowers make it impossible to carry out mass emasculation. Also, strong allogamy implies the fact that, with rye, the characters of the different varieties generally have a heterozygous base. Under these conditions, no marked hybrid

vigour effect could be expected. Nevertheless, experiments carried out on the question in Germany (FRUWIRTH) and in Sweden (H. NILSSON) have given not only theoretical but also practical results.

It has been found that the mixture of strains, especially those which denote a certain degeneration due to inbreeding, produces an advantageous effect, and that a competent farmer can use it to increase yields, on the condition that the seed of 2 varieties suitable as parents is sown together. Naturally, only half of the seed obtained from the stand is a cross of the 2 strains; the other half is a mixture, in almost equal parts of the 2 parents.

There is no means of separating the hybrid seed from the parent seed unless it is possible to identify the hybrid seed from its aspect. The investigations of TSCHERMAK and NICOLAISEN on the xenia of rye indicate that there might be such a possibility. All depends on the proper choice of parents. In experiments over 6 years, BREDEMANN and HEUSER found that the Lochow × Jager cross was the best; each year it gave significant yields surpassing by an average of 13.29 per cent. the average production of the 2 parents and, in every case, that of the most productive parent.

The increase in yield obtained, hovever, varied considerably from year to year. There are 'hybrid vigour years' when the desired effect is particularly marked, while it is weaker in other years This phenomenon evidently depends on conditions of fertilization in the respective years. The increase in seed yield is always accompanied by a greater vegetative luxuriance, very important as regards the utilization of hybrid vigour in the production of green forage.

The investigations of H. NILSSON, carried out over 20 years, have thrown new light on the question of hybrid vigour in rye. The results obtained enabled this scientist to establish that, with rye, it is a question of effect of inbreeding which is not, or at least is not exclusively, of a genetic nature. In this cereal, degeneration cannot be explained primarily as an effect of homozygosis, but as a plasmatic influence of the parents on the progeny. A certain heteroplasmony, such as is obtained by crossing, is necessary.

Mention should be made of the interesting fact that H. NILSSON and also J. DUCKERT (1927), in carrying ont inbreeding experiments on rye, managed to isolate self fertile lines, which were not weakened by selfing.

STEWART, LEWIS and COONS in the improvement of the beet applied the single-cross principle utilized in maize.

In the $F_1$ generations obtaining by crossing inbred lines, the weight of the beets surpassed by an average of 39.5 per cent. (9.8-65.7 per cent) the weight of the beets used as initial material. For beet inprovement, therefore, future prospects are very bright. In the U. S. S. R., LEBEDINSKI (1931) utilized the principle of hybrid vigour for beets.

Mention should be made here of the process for the production of 'synthetic varieties' elaborated first by HAYES (in the United States for maize) and subsequently applied to rye by PETERSEN and SPRAGUE. This process consists in dividing a population into numerous inbred lines, of which the best are combined for open-pollination. In the United States, synthetic varieties of sugarbeet, each composed of 5 inbred lines, have thus been obtained and propagated. In

the successive generations, the yield of these varieties only decreases slowly, consequently they can be cultivated several times in succession.

A plant which lends itself well to improvement by hybrid vigour is tobacco. In 1922, F. FRIMMEL published the results of experiments carried out with a view to utilizing, for improving this plant, the stimulating effect of crossing, to showed a decided reaction. In itself, crossing presents no difficulty. The quantity of seed formed in a capsule after one crossing only is sufficient to sow a large area. In former Czechoslovakia, Dr. VAŠA had endeavoured to produce a hybrid vigour tobacco for the tobacco-growing region. Heterosis also finds a practical utilization at the German Tobacco Research Institute (at Forchheim) and at the Russian Institute for the 'Machorka' tobacco.

As regards truck crops, the fundamental conditions for improvement by hybrid vigour to be lucrative are: easy execution of artificial crossing — small and numerous seed in the fruit after one crossing only — spacing of plants and consequently lower seed requirements.

Among the crops grown on a large scale, mention may be made of the tomato as being particularly susceptible to the effect of heterosis. F. FRIMMEL is studying the question at the Mendel Institute of Eisgrub, taking as a basis the results of earlier experiments made in 1912 by R WELLINGTON in the United States. He has succeeded in elaborating a simple method of mass crossing and applying in practice the principle of improvement by hybrid vigour. The hybrid named 'Heterosis' has been placed in commerce. The hybrids are earlier than the parents. FRIMMEL fertilized 100,000—150,000 tomato flowers per year. The hybrids gave considerable increases in yield, even in comparison with the best varieties employed as parents. They are also very early, which constitutes, especially in the tomato, an appreciable advantage from the economic standpoint. In the United States, W. F. WHALEY has studied hybrid vigour in the tomato. In applying this principle, HAYES obtained an increase in yield of 15 per cent; in experiments made in Poland, this increase even attained 50 per cent. In the U. S. S. R., CHEGALOV and KETRAR are studying the question.

This principle has also been applied in Bulgaria, taking as a basis the method elaborated at Eisgrub. Chr. DASKALOFF at the Plovdov Agricultural Experiment Station, has extended the use of this method to the eggplant, and has obtained increases in yield amounting to an average of 24 per cent. and a maximum of 44 per cent. As regards earliness, eggplant hybrids outdo their parents. The production of large quantities of hybrid seed for commerce is relatively easy and quite justified from the economic viewpoint. A practised worker can carry out per day, on an average 100 emasculations, pollinations and isolations of inflorescences; 400-500 g. of hybrid seed will be obtained, quantity sufficient to sow about 2 ha. In Japan, Y. KAKIZAKI has studied the improvement of eggplants by hybrid vigour and has endeavoured to popularize the hybrid varieties obtained.

Spinach similar to maize, is a diclinous, anemophilous plant, which semplifies considerably emasculation and cross-fertilization, and especially facilitates improvement by hybrid vigour; hybrid vigour spinach has already been adopted in practice (NICOLAISEN).

Breeders have even attempted to tackle such an unpromising plant as the carrot which, after each cross-fertilization of a flower, only supplies one dehiscent fruit containing 2 seeds. A yield increase in roots has been obtained. POOLE (at Davis, California) observed very marked hybrid vigour in the crosses of inbred lines of this plant. Up to the present, however, the use of hybrid vigour seed in practice has clashed with the high cost of production

Heterosis also finds a practical utilization in floriculture. For many years an establishment at Erfurt (Germany) has put on the market hybrid vigour strains of begonias, double *Tagetes*, etc.

Heterosis is particularly important in the improvement of ligneous plants, especially in all cases where the product of the crossing is propagated vegetatively In these cases, the work of the breeder is naturally profitable, even if it is difficult and laborious, as one initial plant suffices for the multiplication In general, it is not a question of systematic improvement through hybrid vigour based on the production of inbred lines, but a simple crossing of different strains, varieties or even species and of the vegetative luxuriance of the $F^1$ generation, sought for or else only obtained by chance.

Examples which have become famous are the walnut hybrids 'Paradox' (*Juglans regia* × *J californica*) and 'Royal Black' (*Juglans californica* × *J nigra*) of Luther BURBANK at Santa Rosa (California).

Frequently, such hybrids are sterile, especially when unrelated strains are combined This phenomenon is unimportant if the plant in question is not utilized for its fruit or seed; on the other hand it is advantageous in this sense that the material which would normally serve for fruit and seed formation remains entirely available for the development of vegetative organs and in this way increases the practical value of hybrids

In horticulture, heterosis hybrids have always been employed The catalogues of horticultural firms list numerous hybrid bushes and trees of luxuriant growth to which they owe their value as ornamental plants As examples may be cited the ornamental shrub 'Magnolia Yulan' and the hybrid *Catalpa bignonioides* × *C. kaempferi*.

The luxuriant growth of hybrids, however, has a much greater economic importance in the field of dendrology; as the first to study the question, may be cited KLOTSCH (Berlin) who, as early as 1845, had effected crossings of species of pine (*Pinus sylvestris* × *P. austriaca*) and of oaks (*Quercus pedunculata* × *Q. sessiliflora*). Although in these hybrids, there was an increase in luxuriance of growth of about a third, his experiments were soon forgotten. They were only resumed and continued later in Ireland, by A. HENRY, who may with good reason be considered as the oldest authority on the hybridization of forest species. His early publications on the subject date back to 1910 and brought before the public eye his hybrid poplar *Populus generosa* obtained from *Populus angulata* × *P. trichocarpa*. In 1919, he published a work on hybrids of larches (*Larix eurolepsis*) and on other hybrid conifers. As regards recent works, particular mention should be made of the studies of W. VON WETTSTEIN on the first generation ($F_1$) hybrids of poplars, among which that of *Populus alba* × *P. tremula* which produces a par-

ticularly luxuriant growth. The stately bearing of the *Populus nigra* × *P. lasiocarpa* makes it a favourite in gardens. Mention may also be made of the osier crosses effected by SUKATCHEV (U. S. S. R.).

We will not enlarge further on the utilization of hybrid luxuriance which shows such promising prospects in sylviculture.

## Fixation of hybrid vigour

As hybrid vigour can increase yields, the question is naturally raised as to whether it is possible to render this effect durable by fixing it, so to speak. As long as it is a question of plants reproduced by vegetative propagation, as is the case for many ornamental and forest plants mentioned above, the effect of hybrid vigour may be maintained indefinitely. To this group of plants also belongs the potato, and there is reason to believe that, in the results obtained in its improvement, hybrid vigour plays an important part which, up to the present has remained unnoticed, but which will certainly be better understood in the future, as studies on the subject have already been started.

In regard to the hereditary transmission properly so called of the luxuriant growth, it contradicts the definition of the term 'heterosis' generally given. As has already been stated, the typical symptom of hybrid vigour is considered to be its sole appearance in $F_1$ and its decline in successive generations

All scientists, however, do not accept this definition and neither do they agree as to the causes of hybrid vigour. For scientists who, like KAPPERT, tend to concede that heterosis (at least in some cases) is the more or less complex result of a cumulative action of different factors, the logical consequence would be that hybrid vigour can be fixed by selection processes. D. F. JONES, in attempting to explain hybrid vigour, also comes to the conclusion that its effect can be maintained by hereditary transmission. It is true that the large number of yield factors coming into play and the linkage of dominant factors may render selection very difficult, but they cannot make it ineffective. It would only be a question of carrying out selection on a fairly abundant material in order to be able to isolate the required combination, which is very rare. All this work, however, may sometimes be beyond the means of the private breeder.

The conclusions drawn from these theoretical considerations led RICHEY in the United States some years ago to carry out exhaustive studies and experiments on the subject and to apply the convergent breeding method to maize. It consists in alternating systematical selfing with allogamous fertilization directed with a view to combining the desirable characters of 2 allogamous varieties. The aim is also to maintain, in the homozygons state, the increase in growth or yield which is manifested in the heterozygous state in hybrid vigour plants.

In practice, it has often been possible to successfully transmit hereditarily and fix hybrid vigour phenomena. In this respect, as an example may be cited tobacco, plant for which breeders have studied this question and solved practically.

E. MALINOWSKI (1928) has endeavoured to maintain hybrid vigour in beans. In his experiments in the 2nd and 3rd generation of a cross, there was a segre-

gation of individuals which owing to marked hybrid vigour showed a much more luxuriant growth than those of $F_1$ and even transmitted this character to their progeny.

In this regard, mention should also be made of the information given by A. B. SALAMOV (1939) on the production of maize hybrids which transmit their vigorous growth to the subsequent generations; this information, however, is not very convincing

## Conclusion

Since the crossing of 2 genetically different individuals exercises such an advantageous effect on the productivity and on other characters of the following generation, it may be asked if a like effect does not also take place on crossing genetically similar individuals, as there are in the really pure varieties of autogamous plants, LYSSENKO responds affirmatively to this question and bases on this concept his method (which made a sensation) of 'regeneration' and 'rejuvenation' of wheat varieties. He carried out mass crossing within a variety. The successive generations produced from the crosses would be more viable, more easily adapted and consequently more productive than the initial variety It appears that good results were obtained in practice According to communications from Russia, in 1937-38, 50,000-65,000 ha had been sown to this type of seed.

In opposition to this concept are the results of certain theoretical considerations and numerous studies and experiments as, for example, the experiments of F. BOEUF, which show definitely that crossings within a pure variety do not increase yield. BOEUF concludes that a truly pure line, that is to say, homozygous, comprising one genotype, cannot be modified by a crossing of individuals within this line. Things are quite different when it is not a question of a pure line, but a mixture of lines or even varieties, as would be the case in practice in Russia. In a like case, a crossing within the variety may very well increase yields.

It may also be asked whether, in the case of autogamy (wheat), the cultivation of an absolutely pure variety should be considered as the supreme objective. To be sure the propagation of pure varieties is one of the greatest advances in agriculture since the beginning of the present century. It is no less sure, however, as has already been seen, that a certain degree of heterozygosis generally assures a better development and, consequently, higher yields. The aim to follow, therefore, is not so much to obtain an absolutely uniform population from the genetic standpoint, but rather to produce as uniformly a population as possible from the phenotypic standpoint, but heterozygous from the genotypic standpoint, as is obtained by mixing pure lines with similar external characters. In autogamous plants, heterozygosis decreases regularly and by itself during the successive generations. Crossings within a variety, therefore are desirable and effective in checking this process. In this sense and under these conditions, the 'rejuvenation' method of LYSSENKO is justified.

According to BAUER, the aim which should be followed in the future with autogamous plants does not consist in multiplying a sole pure line, but in pro-

ducing polytype varieties. These obtain, antomatically, through spontaneous crossing, the advantages of increased heterozygosis. Numerous observations have shown quite recently that, with autogamous plants such as wheat, especially in warm climates, spontaneous crossing is much more frequent than was formerly thought. In this way, therefore, heterozygosis also comes into play.

In 1936, M. T. JENKENS wrote as follows: " Hybrid corn has been developed as a result of researches in genetics, the science of heredity, and is an outstanding example, perhaps the most outstanding example of the influence of theoretical scientific research in revolutionizing the production practices of an agricultural crop '.

It is to be regretted that an innovation so sensational and important from the economic standpoint has as yet found so few partisans outside the United States. The difficulties encountered in the practical application of the method, especially under European conditions, however, cannot be denied; these have been indicated earlier on in the article.

To reply to the various enquiries addressed to the International Institute of Agriculture, it seemed necessary to discuss the question of hybrid maize production, encompassing it in the ensemble of questions regarding maize improvement by hybrid vigour. It also seemed to us of interest to give (see p. 286) details on a simplified process for the production of hybrid maize on the farm. When the use of hybrid seed produced on the farm will be implanted, the desire will naturally come to transfer the selection work thus accomplished to special, properly equipped establishments. In this manner, the way is opened to the inprovement of the method on the American model. In the countries where, owing to local conditions, the production and sale of maize hybrid seed do not appear profitable for the private breeder, it will be the province or the State to assume this task, being of public interest, or else to carry it out with the collaboration of private breeders.

In regard to the immense importance of hybrid vigour in maize improvement, its value for other cultivated plants appears much less. Nevertheless, improvement by heterosis and the simple production of hybrids have given very important results with truck crops, ornamental plants and ligneous species. In this field, the systematic utilization of hybrid vigour can still bring about considerable progress.

The bringing about of hybrid vigour is not in itself an act of complete and indipendent breeding; hybrid vigour cannot, in any way, replace true breeding work but only supplement the work of the breeder as the final step towards the obtaining of seed and of plants of the highest possible yield and economic value.

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PRESENT PROBLEMS IN ANIMAL NUTRITION

# NUTRITIVE VALUE FOR RUMINANTS OF PROTEINS IN COMMON FEEDING STUFFS

by F. B. MORRISON and J. I. MILLER

*The determination of the value of proteins in animal feedingstuffs is one of the chief problems in the science of nutrition in recent years. This article which was especially written for the* Bulletin *by eminent specialists at the Cornell University (New York, U. S. A.), furnishes a valuable contribution on the subject.*

## General

Many investigations have been conducted with non-ruminants to determine the nutritive values, measured in various ways, of purified individual proteins separated from various plant and animal products, or of the mixture of proteins occurring in different single natural foods or feeds. The metabolism experiments of this type have nearly all been conducted with rats as test animals, and but a very few such investigations have been made with swine or poultry.

The studies of this type often have no *direct* application to the practical feeding of livestock or even to the providing of adequate diets for humans. This is because we do not feed humans or farm animals purified proteins, and ordinarily the supply of protein comes from more than one source. Theoretically, it is possible for two incomplete and inefficient proteins to supplement each other so as to make an efficient source of protein to the body.

In addition to the results of metabolism experiments with non-ruminants, considerable information concerning the nutritive values of the proteins in our common feeding stuffs is furnished by the numerous practical feeding experiments that have been conducted with swine and chickens to compare the values for these species of the various protein-rich feeds as supplements, especially as supplements to the cereal grains.

But relatively few metabolism experiments have thus far been conducted to determine the values for ruminants of proteins from different sources. Moreover, much less information is available on this subject from the results of practical feeding experiments than in the case of swine or poultry.

## 1. — Methods of comparing proteins

In comparing the nutritive values of proteins from various sources, several different methods of measurement are used. One of the most common methods is to determine the biological value of the protein according to the Thomas-Mitchell method. The biological value is the percentage of efficiency of the protein for maintenance and growth, combined.

It has been proved that the amino acid requirements for mere body maintenance are different and less rigorous than those for growth. Therefore, biological values secured with young animals which are making good gains in protein cannot be safely compared with others obtained with young animals storing little or no protein Yet this fundamental fact has often been ignored

Recent investigations at the Washington Station with chicks show the wide differences there may be in the relative values of two sources of protein when measured by different experimental methods The value of the protein in soybean oil meal (hydraulic process) was compared with that in casein by six methods of experimentation with the following results:

| | Protein values Casein | Soybean oil meal |
|---|---|---|
| Mitchell's biological value method | 78 7 | 74 2 |
| Cornell protein retention method | 100 0 | 81 9 |
| Washington State College biological value method | 92 3 | 90 5 |
| Almquist chemical method | 91 1 | 90 5 |
| New gross protein value method of Washington State College | 100 0 | 58 5 |
| Ordinary growth (interpreted same as preceding method) | 100 0 | 56 3 |

In the new 'Gross protein value method' proposed by the Washington investigators, the relative value of the protein in a protein supplement is determined in comparison with that of casein, when used to balance a low-protein ration adequate in vitamins and minerals, in which nearly all of the protein is furnished by a mixture of cereal feeds with 6 per cent alfalfa leaf meal. Palatability is a factor in this method of measuring the value of a protein supplement. Though it may be important from the practical standpoint, palatability is not a factor in the biological value method, or in the Almquist chemical method.

## 2. — Differences in the relative ranking of proteins

Such differences in the relative ranking of the proteins in two feeds as are shown in this table certainly merit much further investigation.

Numerous investigations have shown that proteins from various sources have radically different nutritive values for non-ruminants which have a simple

stomach, including rats, poultry, swine, dogs, and humans. For such animals the proteins of the cereal grains are of low value, compared to the proteins of milk, eggs, meat, and fish, all of which are of high nutritive value. They fortunately supply a high proportion of those essential amino acids which are contained in scanty amounts in the cereal grains and most other foods of plant origin.

In livestock feeding, milk and the meat and fish by-products are of especial value in making good the deficiencies in the quality of protein in the rations of swine and poultry. Though the protein of tankage or meat scraps is not of high quality when forming the only source of protein, nevertheless, these meat by-products are efficient protein supplements to grain and grain by-products.

In general, the germs of the cereal grains have proteins of much better quality than the endosperm, or starchy part of the kernels. Also, in the case of wheat grain, the bran layers provide protein of higher nutritive value than the endosperm. Wheat bran, wheat middlings, and red dog flour, therefore, furnish protein of considerably better quality than does wheat flour or even the entire wheat grain. This helps to explain the popularity of wheat by-products for stock feeding.

The proteins of legume seeds differ to a surprising degree in value for non-ruminants. At one extreme are most beans and also cowpeas and lentils, whose proteins are of low value, being markedly deficient in cystine. At the other extreme are soybeans and peanuts. When well-cooked, soybeans provide protein for non-ruminants that is superior to that from most other plant sources, and only inferior to that of animal origin.

Linseed meal and cottonseed meal are two of the most important and most common protein supplements for livestock, but for non-ruminants the quality of their protein is much inferior to that of milk. Corn gluten meal and corn gluten feed, which are both corn by-products, undoubtedly supply protein of poor quality for non-ruminants, for most of their protein is zein, which lacks lysine and tryptophane.

For non-ruminants the proteins of legume forages are apparently not of high efficiency. In Oregon experiments with rats, alfalfa protein seemed to be deficient in cystine, although in English tests it seemed to contain ample cystine. In Illinois exportments the protein of a ration of alfalfa hay and corn had a biological value of only 62 per cent. for rats.

To summarize the results of numerous feeding experiments with swine and poultry, the following statements may be made: It is apparently impossible to make up a ration from cereal grains and any of their by-products which provides protein of satisfactory quality for good growth of pigs or chicks or for normal egg production. The quality of protein can be improved somewhat, but cannot be made adequate by the addition only of such protein supplements as linseed meal, coconut oil meal, cowpeas, or field peas. To make a ration that is entirely satisfactory in quality of protein, it is generally necessary to furnish part of the protein in such feeds as milk by-products, fish meal, tankage, or meat scraps. Well-cooked soybean oil meal is probably the best substitute for such feeds of animal origin.

## Nutritive value of proteins for ruminants

Before any definite information had been gained by means of metabolism experiments concerning the value of the protein in various feeds for ruminants, it was evident from the experience of farmers and from the results of practical feeding experiments that it was unnecessary to provide protein of animal origin for cattle and sheep, after they had reached the usual weaning age. Entirely satisfactory rations were furnished by cereal grains with legume hay or mixed hay, and with or without corn or other silage. When such rations were deficient in amount of protein, the lack would be entirely made good by the use of such protein supplements as linseed meal, cottonseed meal, and wheat bran, which are not satisfactory as the only protein supplements for swine or poultry

### 1. — Metabolism experiments

Additional information was furnished several years ago by metabolism experiments with dairy cows at the Wisconsin Station conducted to compare the values of various protein supplements for milk production When cows were fed cereal grain with either clover or alfalfa hay plus corn silage, there was little difference in the efficiency of corn gluten feed, linseed meal, cottonseed meal, or distillers' corn dried grains as protein supplements On the other hand, when corn stover was the only roughage, corn gluten feed was distinctly inferior to the protein supplements that provided protein of better quality for non-ruminants

On account of the meager data concerning the values of the protein in common feeding stuffs for ruminants, the senior author decided in 1932 that it would be wise to begin a series of metabolism experiments with growing lambs to secure such data. The early experiments were conducted by Prof. Kenneth L. Turk under supervision of the senior author and Prof. L. A. Maynard, while the later experiments have been conducted by the junior author of this paper.

When these investigations were begun, it had recently been reported elsewhere that alfalfa hay, fed as the only feed, furnished protein of poor quality for growing lambs, the biological value being only 56 per cent However, we doubted whether these data really proved that the protein of alfalfa hay was actually of poor quality for ruminants. This was because lambs and calves grow so well on legume pasture, and make such satisfactory gains on only alfalfa hay and corn or other grain.

In our first experiments, we, therefore, determined the nutritive value of the proteins in alfalfa hay and in red clover hay, when each was fed as the only source of protein in a ration having plenty of energy. We also studied the value of the protein in rations of alfalfa hay and corn and of clover hay and corn.

The protein in all four rations proved to be of very satisfactory quality, no matter whether measured in terms of biological value or in terms of percentage of total protein in the ration that was stored by the lambs. The biological values averaged 79 per cent for alfafa hay, 81 per cent for red clover hay, 77 per cent. for alfafa hay and corn grain, and 80 per cent for clover hay and corn grain.

Our work showed that the low value for alfalfa hay secured by the previous investigator was due to the fact that when alfalfa hay is fed alone, without an added source of energy, it does not supply sufficient non-nitrogenous nutrients to enable animals to use the protein with maximum efficiency.

Since there was no significant difference in the values of the protein in these 4 rations for growing lambs, we next conducted studies with common feeds whose protein undoubtedly has widely different values for swine, poultry, or rats. Corn gluten meal, a corn by-product, was selected as a feed having low quality of protein, among the common protein-rich concentrates. Well-heated expeller process soybean oil meal was chosen as a common feed supplying high quality of protein for non-ruminants, and linseed meal was included as being one of the most popular protein supplements.

Lambs were fed rations in which these three feeds furnished nearly all the protein, additional energy being furnished by pure non-nitrogenous nutrients, with purified cellulose as roughage. It was necessary to include in the rations a small proportion of wheat straw (which is very low in protein) to induce the lambs to consume sufficient amounts of the rations to make the desired growth

When thus fed to 7 individual lambs there has been no difference whatsoever or no significant difference in the nutritive value of the protein from these three widely differing sources. Also, in experiments with 4 animals corn gluten meal was fully as efficient a source of protein as casein or dried skimmilk.

These results indicate either that the requirements of growing lambs for essential amino acids are much different from the requirements of rats, swine, or poultry, or probably that ruminants have a much greater ability than rats, humans, swine, poultry, or dogs to synthesize the amino acids that are essential for them. At least, the kind or quality of protein is apparently of decidedly less importance in the rations of such ruminants as sheep or cattle than in the case of the animals which have a simple stomach and no great cecum, like the horse.

This difference is presumably due to the following: The digestion of cellulose and pentosans by ruminants is caused chiefly by the bacteria and other micro-organisms which thrive and multiply in great numbers in the rumen or paunch. These bacteria can probably use certain other simple nitrogenous compounds, in addition to the amino acids, for making the proteins in the cells of which they are composed. Further on in the digestive tract of the ruminant, these bacterial cells may be digested, and the protein that has been synthesized by the bacteria thus made available to the animal. This bacterial protein may hence provide all the essential amino acids, even though they were lacking in the nitrogenous food used by the bacteria in their growth.

*Use of non-protein nitrogenous compounds*

Several investigations were conducted several years ago, especially in Germany, to determine the extent to which various non-protein nitrogenous compounds can be used by ruminants as a substitute for protein. The results, however, differed so greatly that no definite conclusions could be drawn.

Recent investigations at the Wisconsin Station and the New York (Cornell Station have proved definitely that the nitrogen of both urea and ammonium carbonate can be utilized by ruminants for at least a partial supply of protein nitrogen In the Wisconsin experiments growing calves were fed a basal ration of timothy hay, corn grain, and corn starch, with steamed bone meal, iodized salt, and cod-liver oil, and with 10 per cent of corn molasses in the case of certain animals. Some of the animals were fed casein as a protein supplement, while others received urea or ammonium carbonate.

Decidedly greater growth resulted on the rations containing urea or ammonium carbonate than on the check ration, although the growth was slightly less rapid than on the ration containing casein. Analyses of the tissues of the animals at the end of the second experiment showed that they had a normal content of true protein In these experiments the urea furnished approximately 43 per cent of the nitrogen of the ration.

In the Cornell experiments, which were metabolism studies with growing lambs, we compared urea, casein, dried skimmilk, and linseed meal when forming nearly all the nitrogen in a ration that was made up chiefly of purified nutrients. When subjected to this very rigorous method of investigation, the percentages of nitrogen stored by the lambs were 20.4 per cent for the casein ration, 19 per cent for the dried skimmilk ration, 22.7 per cent for the linseed meal ration, and only 2 0 per cent for the urea ration. It should be pointed out that while the lambs could make but little gain in protein tissue with urea nitrogen as practically their entire nitrogen supply, they were able to keep in positive nitrogen balance Thus they could slightly more than maintain themselves on this simple source of nitrogen

The possible use of urea as an ingredient of rations for livestock is of interest at this time, since urea made by the synthetic process from air nitrogen may cost less than nitrogen in our common feeds. In the opinion of the authors of this paper, much more experimental data should be secured before legislation is changed to permit the use of urea as a source of nitrogen in mixed feeds for cattle and sheep. The investigations should include carefully-conducted and long-time practical feeding experiments with *high-producing* dairy cows and also with fattening cattle and fattening lambs which are sold on a discriminating market where good finish brings a premium.

At present there is certainly no reason for haste in authorizing the use of urea in mixed feeds, for there is no dearth of well-known protein supplements of proven value in the United States. On the contrary, there is even an oversupply and in this section of the country some protein supplements of the highest grade have been selling at a lower price than corn or other farm grain..

*Effects of cooking and oil extraction*

In has been shown in experiments elsewhere that the quality of protein in soybeans is greatly improved by thorough cooking for rats, swine, or poultry. We have, therefore, conducted tests recently to find whether heat treatment or oil extraction improves soybean protein for lambs.

In metabolism experiments with 16 lambs, the average percentage of total nitrogen stored was 18.8 for raw soybeans, 23 8 for solvent process soybean oil meal without special heat treatment, and 27 3 for soybean meal which had been specially heat-treated. There was but little difference in the biological values of the protein from these 3 sources, the average values being 62, 62, and 64 per cent. respectively. The chief difference was in the digestibility of the protein, 63.6 per cent. of the protein in raw soybeans being digested, in comparison with 70.6 per cent. for the heat-treated soybean oil meal. The addition of soybean oil to the heat-treated soybean oil meal did not decrease its utilization, but, in fact, tended to increase the efficiency of the protein

2. — FEEDING EXPERIMENTS

Along with these metabolism experiments, we have been conducting feeding experiments to study the value of proteins from various sources in practical rations for dairy cows, fattening cattle and fattening lambs

Three experiments have been conducted to determine what the effect would be of feeding high-producing dairy cows rations differing widely in quality of protein. (The first two trials were by Salisbury and the senior author, and the third trial by Bratton, Salisbury and the senior author ).

In these trials corn silage and mixed hay low in percentage of legumes was the roughage One group of cows received a ' poor-quality-protein ' concentrate mixture consisting of ground corn, ground oats, corn gluten feed, corn gluten meal, bone meal, and salt The other received a ' good-quality-protein ' mixture containing in addition, soybean oil meal, linseed meal, cottonseed meal, and distillers' dried grains.

The results of the first experiment seemed to indicate that it was important that a concentrate mixture supplying good quality protein be fed to high-producing cows that received but little legume roughage. In the other experiment there was no significant difference in the results from the two rations, though the hay contained even less legumes. Further work must, therefore, be done before conclusions can be drawn.

In conclusion, it may be mentioned that we are conducting a series of feeding experiments with fattening steers and fattening lambs to compare soybean oil meal, raw soybeans, corn gluten meal, and linseed meal as protein supplements to rations low in protein.

Care is taken to keep the amount of protein in each ration constant. Thus far, corn gluten meal, used as the only protein supplement, has tended to produce slightly, but only slightly, less rapid gains than the other protein sypplements. Further data is necessary before definite conclusions can be drawn concerning the values of these 4 sources of protein for fattening cattle and lambs.

# *MISCELLANEOUS INFORMATION*

## Rejuvenation of rubber plantations in Indochina

The Indochinese Government having expressed the fear that rubber production would drop during the next few years in consequence of the comtemplated rejuvenation plan, the Rubber Planters' Association of Indochina was called upon to pass its opinion on the question.

A report of the 'Société des Plantations des Terres Rouges', which is one of the chief rubber-producing associations, indicates that, in view of the intensive tapping which precedes the felling of the trees, on the coming into tappability of the areas rejuvenated within the last few years, the production of the three coming years will be maintained at the present level.

The Syndical Chamber approves the similar conditions which have been addressed to the Administration; there being no need for apprehension, the said body hopes that the Administration will not make any restriction in the policy of rejuvenation, this latter being the only means of safeguarding the production potential of Indochinese hevea cultivation.

The following data have been abstracted from the report on replanting drawn up for the purpose of studying the consequences of a replanting policy on the production potential of the 'Société des Plantations des Terres Rouges'.

The figures on which this study is based are:

| | | |
|---|---|---|
| Planted area of the Association on January 1, 1941 | 33,654 53 | ha |
| Tappable area on January 1, 1941 | 29,644 56 | » |
| Area not in production | 4,009 87 | » |
| Cultivated in 1935 | 55 50 | » |
| » » 1936 | 124 11 | » |
| » » 1937 | 178 12 | » |
| » » 1938 | 180 55 | » |
| » » 1939 | 1,817 60 | » |
| » » 1940 | 1,653 99 | » |

The areas recently replanted and to be replanted in the following years will be constituted entirely of superior quality material. We will concede therefore for these areas the following production potential, which present test tappings appear to justify amply:

| | | | | | | |
|---|---|---|---|---|---|---|
| 5th year | 150 | kg | per | ha. | per | annum |
| 6th » | 300 | » | » | » | » | » |
| 7th » | 600 | » | » | » | » | » |
| 8th » | 900 | » | » | » | » | » |
| 19th » | 1,200 | » | » | » | » | » |
| 10th » | 1,400 | » | » | » | » | » |
| 11th » | 1,500 | » | » | » | » | » |
| 12th » | 1,600 | » | » | » | » | » |
| 13th » | 1,700 | » | » | » | » | » |
| 14th » | 1,800 | and over. | | | | |

The report then indicates the production estimates of the Societe des Plantations de Terres Rouges (1) in the case of stopping replanting at the end of 1940, (2) in the case of continuing replanting at the rate of 1 000 hectares per year an actual yield of 600 kg per ha per year for the areas to be replanted is allowed The trees to be felled being tapped to exhaustion point during the course of the last two years, give during this period a yield double the normal as above i e 1 200 kg

The final balance of the production of one hectare (trees felled) therefore would be as follows

| Date | Production per ha if trees were not felled | Production per ha when replanted | | Difference | | Balance in kg ha |
|---|---|---|---|---|---|---|
| Overproduction up to felling | | | | | | 1 200 |
| At the end of the | | | | | | |
| 1st year | 600 | 0 | | 600 | | 600 |
| 2nd " | 600 | 0 | | 600 | | 0 |
| 3nd | 600 | 0 | | 600 | | 600 |
| 4th | 600 | 0 | | 600 | | 1 200 |
| 5th | 600 | 150 | | 450 | | 1 650 |
| 6th | 600 | 300 | | 300 | | 1 950 |
| 7th | 600 | 600 | | 0 | — | 1 950 |
| 8th | 600 | 900 | + | 300 | — | 1 650 |
| 9th | 600 | 1 200 | + | 600 | — | 1 050 |
| 10th | 600 | 1 400 | | 800 | | 250 |
| 11th | 600 | 1 500 | + | 900 | | 650 |
| 12th | 600 | 1 600 | | 1 000 | | 1 650 |
| 13th | 600 | 1 700 | | 1 100 | | 2 750 |
| 14th | 600 | 1 800 | + | 1 200 | | 3 950 |
| 15th | 600 | 1 800 | | 1 200 | + | 5 150 |
| 16th | 600 | 1 800 | | 1 200 | | 6 350 |

The putting into tapping of the 1935 to 1930 lots partly conceals the effect of lowered production due to felling and the following conclusions are derived

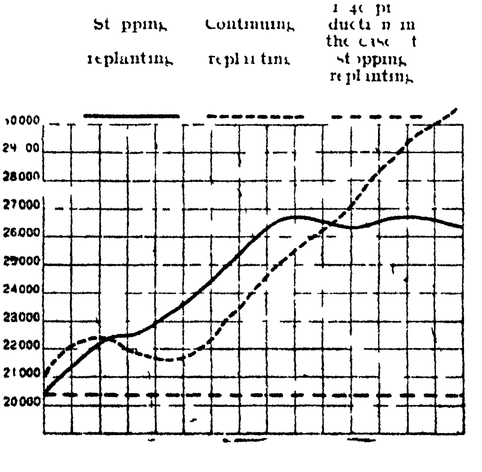
(1) the carrying out of replanting under the conditions considered will lead to an increase in production in the next three years,

(2) in the eight subsequent years the continuation of the replanting program will bring about a lower production than in the case of stopping replanting Production, however, would never be inferior to the present output,

(3) in the following years an appreciably higher production would be obtained

The following of a replanting policy will enable Indochina to maintain itself

*Diagram of production estimates of the Societe des Plantations de Terres Rouges in the case of stopping replanting and in the case of continuing replanting*



on the same plan as the other rubber producing groups of the Far East, these latter having practised and still continuing a vigourous policy of replanting. An eventual crisis, therefore would not find Indochina in an unfavourable position in comparison with its neighbours. In the contrary case, the production costs of other producers standing at a lower level than in Indochina, the latter would find itself at a disadvantage on the world market.

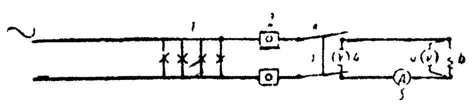
Another advantage of a replanting policy is the improvement of the status of natural rubber as compared with synthetic products. A low cost price is the best weapon in this contest (*Bulletin du Syndicat des Planteurs de Caoutchouc de l'Indochine*, 1940, Nos. 245 and 246)

C. A G.

## Influence of electric current on ripening of cheeses

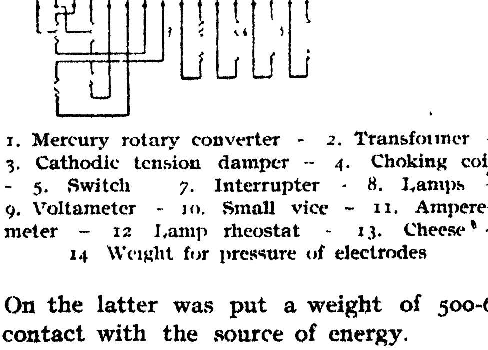
P. T. Sisiukine and L. Iliach at the Institute of Agriculture at Vologda have carried out researches with a view to studying the influence of electric current on the ripening of cheeses (*Molotchnaja Promychlennost*, Moscow, 1938, No. 3). Two pieces of Backstein cheese were subjected to a continuous electric current in order to establish the cataphoretic action on the proteinic molecule, while two other pieces were subjected to altternating current to observe the action of heat and frequency on the microflora Processing was normal The salt added was in crystal form, ripening was effected at 12° C. with a relative humidity of 95-98 per cent., ripening period, one month. The usual precautions were taken while cheese was in the ripening rooms turning of cheeses, ventilation, etc.

*Diagram of coupling of alternating current in the cheese*



1 Lamp rheostat – 2. Lamps - 3 Knife switch 4. Voltameter – 5 Amperemeter 6 Cheese

*Diagram of transformer installation B-4 type for charging*



1. Mercury rotary converter - 2. Transformer - 3. Cathodic tension damper – 4. Choking coil - 5. Switch 7. Interrupter - 8. Lamps - 9. Voltameter - 10. Small vice – 11. Amperemeter – 12 Lamp rheostat - 13. Cheese - 14 Weight for pressure of electrodes

Experiment technique. Two aluminium plates 25 cm. in diameter were used as electrodes. One plate served as a support and was covered with parchment 30 cm. in diameter moistened with a weak solution of NaCl. On this support was placed the cheese, moistened on the upper surface with a weak salt solution and covered with another wet parchment on which was placed the second aluminium plate. On the latter was put a weight of 500-600 grams, in order to establish a good contact with the source of energy.

*Calculation of energy.* — To heat the cheese up to 30° C. it is necessary

$$Q = mc\,(t_1 - t_2) = 2 \times 0.68\,(42-12) = 40.8 \text{ cal}$$

$m$ = weight of cheese, $c$ = specific heat (45 per cent. fat in the dry matter) = 0.68; $t_1$ = temperature of the room; $t_2$ = final temperature.

$$W\ min = \frac{Q}{0.0143} = \frac{40.8}{0.0143} = 2853\ W\ min.$$

Current was $I = 4.0$ a, $U = 44$ v.

The cheese was subjected to continuous current and to alternating current for 20 minutes, the current changing every 10 minutes. $Q = 0.24 \cdot I \cdot U \cdot t$.

The heat ceded by the current to the cheese was $Q = 0.24 \cdot 4 \cdot \frac{44}{10} \cdot 2\,6 =$ 50.7 cal. and the temperature of the cheese $t = \frac{Q}{m\,C} = \frac{50.7}{2 \times 0.68} = 40°$ C.

This system was applied during 10 consecutive days. At the end of 45 days, the control cheese was normal in quality while the cheese subjected to an alternating current was bitter and not compact. The cheese subjected to a continuous current had a soft crust and a better flavour than that of the control cheese, resembling that of Dutch cheeses. A second examination made after two weeks on the control and on the cheese subjected to the action of electric currents, showed that the cheese undergoing the continuous current treatment was the best quality cheese.

No data from chemical analyses are available and consequently there is no information on the degree of scission of the proteinic molecule and on the ripening of the cheese. After 30 days, a microbiological analysis was made. The cheese subjected to continuous current and the control showed per gram in a Petri dish 30 thousand germs belonging to a microflora different from the normal microflora.

On the contrary, the cheese subjected to an alternating current contained no foreign microflora. These preliminary experiments show that electric currents exercize an influence on flavour (continuous current) and on extraneous microflora (alternating current). Further studies will lead to establishing the causes of the different ripening of cheeses, to finding methods of controlling the extraneous microflora and to bringing about those modifications in the paste and flavour most suitable for the different cheeses.

G. S.

## *BOOK NOTICES* *

SVOBIDA, Lawrence. *An Empire of Dust*, Caldwell, Idaho, Caxton Printers, 1940, 203 pp., 43 illus.

In the June number of this *Bulletin*, M. H. H. BENNETT showed the importance of the soil erosion problem for the greater part of the agricultural regions of the United States. The tremendous dust storms which began about 1933 opened the eyes of the great American public on this question and made it understand the dangers of wind erosion.

This work will certainly contribute towards arousing world interest in the process of 'transformation into deserts' of a large part of the States of the Middle West. The

* Under this heading are included short synopses of books received for review.

author describes the establishment, early success and ruin of his property; the story covers a period of several years and is written by a farmer who handles the pen as skilfully as the plough.

The usual hazards of dry-farming are known; but the risks the farmer in dry regions runs, owing to excessive drought or rains coming at the wrong time, are generally counterbalanced by high yields in the good years. In the present case, however, the combination of sand storms with several dry seasons has ruined for ever, according to the author, a large part of the Great Plains regions The territory in question would be about equal in area to all Germany, France and the British Isles.

The author praises the numerous measures taken by the American government to assist the farmers and to control wind erosion. Although calling these efforts heroic, he remains pessimistic, considering that man is too late to dominate the forces of nature which, alas, he has unloosed himself.

W. B.

PARODI, Ernesto *Agricoltura tropicale e subtropicale* (La nuova agricoltura d'Italia). Turin, Unione tipografico-editrice torinese, 1941, 503 pp., 2 plates, 330 figures Net Price· 90 lire.

This work is a concise manual on tropical and subtropical agriculture, in which the essential parts are illustrated with well chosen figures. After a brief definition of tropical countries, their climate and influence on the human body, the author begins with soil classifications and the question, particularly important in the tropics, of humus and its conservation. He subsequently deals with the different forms of agriculture (plantations and native farming) and, in particular, Italian colonization in the tropics

A special chapter is devoted to land clearing, and the maintenance and conservation of soil fertility The first part of the book concludes with a brief but very instructive description of ways of living in the tropics (housing, clothing, alimentation, etc ), poisonous animals and various tropical diseases. The author also says a few words on maintaining race purity, question to which great importance is attached to-day.

In the second part, the author discusses in detail the chief crops, in particular, the following. cacao, coffee, tea, sugarcane, textile plants, oil-yielding plants (coconut, oil palm), rubber-yielding plants For all these plants he gives, in a clear and succinct manner, the botanical description and also details on the cultivation and elaboration of the products The author also treats on the latest problems regarding the improvement of these plants.

The author deals rather summarily with fruit tress, spice plants, dye plants and certain juices (tannin for example), as also medicinal and forage plants.

On the whole, this book will be found very comprehensible and useful by the tropical agriculturist

C A G

CAPPELLETTI, F., e CERRINA FERONI, F *La cotonicoltura nel Congo belga* (Relazione di una Missione di studio compiuta nel 1938-39). Relazione e Monografie Agrarie-Coloniali, N. 63. Firenze, Regio Istituto Agronomico per l'Africa Italiana, 1940, 159 pp., 80 figg.

The cotton production of Belgian Congo which totalled, 1,770 tons of raw cotton in 1921, amounted to 134,000 tons in 1939. This considerable advance is due entirely to native cultivation which has developed under the auspices and supervision of the Government. Compulsory cultivation was the basis of this development, the details of which make an interesting study. On the whole, the Belgians have succeeded not only in creating a new source of income for their colony but, at the same, time, in instilling a sense of money values into the native, who continually exposed to famines, lives from day to day. The many difficulties which arose when compulsory cultivation was first introduced are well known, it is also known that later the improvement of quality by controlled selection and organized distribution of seed, the measures taken to assure, in times of depression, a remunerative price to the native grower, organization of markets and cultivation zones have raised as many difficult problems which have had to be studied and for which genial solutions have frequently been found.

The numerous articles published in Belgian agricultural reviews have regularly given information on the rapid progress made by cotton in the Belgian Congo. A comprehensive work covering all problems in their mutual connexion, however, was wanting This gap has now been filled. Two Italian agricultural engineers, F. CAPPELLETTI and F. CERRINA FERONI have profited from a scientific mission to re-assemble all the data presented in this volume, arranged in logical and concise order, *viz.*: natural environment, peoples of the Congo, economic conditions, technical organization of agriculture in general, organization of cotton cultivation, organization of propaganda among the natives, cotton cultivation in native practice, market organization, ginning organization, roads and transport, characteristics and value of Congolese cotton, utilization of cotton and its by-products in the colony itself

A stay of one year enabled the authors to study these problems thoroughly. Their work will be a source of information for all who, like the Italians, propose to propagate cotton cultivation. The absence of a list of the publications consulted by the authors is to be regretted.

W B

## NEW PERIODICALS RECEIVED BY THE LIBRARY OF THE INTERNATIONAL INSTITUTE OF AGRICULTURE

### for the third quarter of 1941 (*).

ARCHIEF voor de suikerindustrie in Nederland en Nederlandsch-Indie. [Pasoeroean, Java], v. 1 (1940)–, bimens. fl. 15.– int.; fl. 25.– étr. [Archives for sugar industry in Netherlands and Netherlands-India].

ARGENTINA. Ministerio de agricultura. Dirección de propaganda y publicaciones. Publicación miscelánea. Buenos Aires, no 2 (1937)–, irr.

CHRONICA nicotiana; Zeitschrift der internationalen tabakwissenschaftlichen Gesellschaft. Bremen, v 1 (4) (1940) -, 4 fasc. p. a. RM. 6.– [Text in various languages].

DEUTSCHE landwirtschaftliche Korrespondenz; Pressedienst für Agrarpolitik, Agrarwirtschaft, Agrartechnik. Berlin, W. Engelbart, v. 13 (1941)–, 3 times a week [Mimeographed].

ESNEA; periodico dedicado a la industria lechera. Buenos Aires, v. 27 (1940)–, 4 times a month, $ 8.– m/n int.; $ 5.– o/s arg. étr.

FROID; organe technique et professionnel des industries du froid. Paris, no 1 (juin 1941)–, mens. frs. 120.– int.; frs. 150.– étr.

GEOFISICA pura e applicata. Milano, Istituto geofisico italiano di Milano. v. 3 (1941)–, irr. L. 80.– int.; L. 100.– étr.

HARVARD forest. Bulletin. Petersham, Mass. no 8 (1925)–, irr.

KOLONIALES Schrifttum; Mitteilungen der deutschen Kolonial-Bibliothek. Berlin, Reichskolonialbund, v. 4 (1941)–, irr.

MACCHINE e motori agricoli; rivista... di meccanica agraria. Bologna, v. 1 (1941)–, bimestr. L. 30.– [Summaries of articles in German, Spanish, French and Italian].

(*) *List of abbreviations:* bihebd. (biweekly); bimens. (twice monthly); bimestr. (every two months) déc. (every ten days); étr. (foreign price); fasc. (copy); hebd. (weekly); int. (home price); irr. (irregular) mens. (monthly); no. (number); N. S. (new series); p. a. (per annum); q. (daily); sem. (half yearly); s. (series); trihebd. (every three weeks); v. (volume); trim. (quarterly).

N. B. — Between brackets [/] are given translations and explanatory notes not appearing in the title of the review.

NANKING. Chin ling ta hsüeh. Nung hsüeh yüan. Yen chin ts'ung pan. [Chengtu, Szechwan], no 3 (1939)–, irr. [Text in Chinese. Title and summaries also in English. University of Nanking. The College of agriculture and forestry. Research bulletin. (Chengtu series)].

NOTIZIARIO della Associazione fascista agricoltori della Libia. [Tripoli], v. 2 (1940)–, mens.

REALE Accademia d'Italia, Rome. Bollettino di informazioni della Reale Accademia d'Italia. [Roma], 1940/41–, mens. L. 20.– int.; L. 25.– étr.

REVISTA rural brasileira; publicação ....sob os auspicios da Sociedade rural brasileira. São Paulo, v. 21 (1941)–, mens. 60$000. [Formerly: Revista da Sociedade rural brasileira].

REVUE internationale du soja; organe d'information et de documentation scientifique, agronomique, industrielle et économique et de vulgarisation pour encourager et développer la culture du soja. [Paris], E. V. Letzgus, 1941–, mens. fr. 120 – int.; fr. 150.– étr.

RIVISTA italiana d'igiene. Pisa, Nistri-Lischi, v. 1 (1941)–, mens. L. 100.– int.; L. 200.– étr.

SVENSKA vall- och mosskulturföreningens kvartalsskrift. [Ultuna], v. 1 (1939)-, trim. [Quarterly review of Swedish society for meadows, pastures and marshes]. [Replacing partly: "Svenska mosskulturföreningens tidskrift" and "Svenska betes- och vallföreningens årsskrift"].

SVENSKA vall- och mosskulturföreningens meddelanden. [Ultuna], no 1 (1939)–, irr. [Summaries in German or in English]. [Communications of the Swedish society for meadows, pastures and marshes]. [Replacing partly: "Svenska mosskulturföreningens tidskrift" and "Svenska betes- och vallföreningens årsskrift"].

WALD und Holz. Offizielles Organ des Generalgouvernements für Forst- Holz- und Jagdwesen. Krakau, v. 1 (1940)–, hebd. RM. 40,90. [Bi-lingual text: German and Polish]. [Title also in Polish: Las i drewno].

Prof. UGO PAPI, *Segretario generale dell'Istituto, Direttore responsabile.*

PRINTING OFFICE CARLO COLOMBO — ROME, SEPTEMBER 13, 1941.

# MONTHLY BULLETIN

OF

# AGRICULTURAL SCIENCE AND PRACTICE


## AGRICULTURAL EDUCATION IN THE ARGENTINE REPUBLIC

A PASCUAL

*This article completes and brings up to date the data regarding agricultural education in the Argentine Republic, published last year by the Institute in the fourth volume of the international enquiry on the subject *.*

### General

When the International Institute of Agriculture published in 1940 the fourth and last volume (bilingual text, French and English) of the monograph on Agricultural Education in the World -monograph which deals with the countries of Central and South America, Asia, Africa and Oceania—it manifested, in the preface of the volume the intention of publishing supplementary notes in this *Bulletin* with a view to amplifying and completing the data and information relative to the development and improvement of agricultural instruction in each of the countries treated in this work

The notes in this article refer to the Argentine Republic, an eminently agricultural and stockfarming country, where agricultural instruction and experimentation are receiving a vigorous and fruitful impulse.

The following general data and information will give some idea of the importance of agriculture and stockfarming in Argentina. This country allots approximately 18 million hectares to cereal cultivation, chiefly wheat and maize; 5.5 million ha to pasturage, mostly lucerne; about 4 million ha. to industrial crops, mainly flax, cotton, sunflower, sugarcane and tobacco and about 1 million ha. to fruit crops Also over 128 million hectares represent grassland, pasture and other forage crops The importance and development of stockfarming are notable as this country possesses 32 million head of cattle, 44 million sheep, 4 million pigs and 9 million horses, mules and asses. This latter category of Argentine livestock, contrary to cattle and sheep, shows a decrease of 12 per cent. within the last ten years due to the ever increasing advance of motorization in Argentine agriculture.

* *Agricultural Education in the World.* (Vol. I-IV, Rome, International Institute of Agriculture, 1935-1940).

Only part of this enormous agricultural and stock production is absorbed in the country. A large percentage has to be exported. This necessity has given rise to a series of problems which have a direct or indirect influence on the development and improvement of agricultural instruction and experimentation in Argentina.

### Creation of the Annals of Agricultural Education

With a view to centralizing and divulging the problems relative to agricultural instruction, the Ministry of Agriculture founded, by Resolution of August 6, 1939, a very interesting review entitled 'Anales de Enseñanza Agricola' under the direction of Prof. Dr. CESAR A. LABARTHE. The object of this review is to document and propagate the instruction which emanates from the activities of the schools and their annexed farms and also the work of the staff employed.

This review which will be published periodically, counts 90 pages and is divided into several sections: (1) Activities of the Division of Agricultural Education (report on the salient facts and work carried out by the Division, its staff and on the activities of the different institutions it comprises); (2) collaboration (publication of original works of practical interest, well documented, the contents to be preferably the description of results obtained from observations, experiments or research carried out in Argentine farms or estates); (3) school chronicles (part reserved for the summing up annually and for each school, the annual Reports and results obtained, etc.); (4) activities of the graduates of agricultural schools (this part will demonstrate the value of the practical and theoretical technical preparation received by the students of Argentine agricultural schools); (5) students' page (publication of the best work of last year students, the results of contests in the schools on subjects which will be given by the principal of each school); (6) information (this section will comprise general annotations of instructive interest of a agricultural, zootechnical or industrial character, with a view to forming a basis for the improvement and development of instruction and giving indications on the methods followed in the farms of the agricultural schools); (7) laws, decrees, resolutions and provisions (all the chief measures for the development of the activities which regard the Division of Agricultural Education).

### Secondary agricultural instruction

Secondary instruction is given in specialized or practical tehnical schools, the chief of which are : (1) National School of Agriculture and Animal Husbandry at Córdoba (Córdoba Province); (2) National School of Agriculture at Casilda (Santa Fé Province); (3) National School of Agriculture and Oenology at Mendoza (Mendoza Province); (4) Practical School at Bell-Ville (Córdoba Province); (5) Dr Ramon Santamarina Farm School at Tandil (Buenos Aires Province); (6) Las Delicias Practical School and annex at Nogoya (Entre Ríos Province); (7) Natio-

nal School of Agriculture and Fruit Industries at San Juan (San Juan Province); (8) School of Aviculture at Colón (Entre Ríos Province)

Students at the authorized schools of agriculture numbered 529 in the year 1939-40 as against 461 in 1938-39.

The School of industrial crops and maté (*Ilex paraguensis*) at Posados (Córdoba Province) possesses an experiment field of maté, mostly in production. The students assist in numerous operations necessary in cultivating this industrial crop; this practical work is a fundamental part of the course.

## Establishment of new schools

By Resolution No. 5669, dated April 25, 1939, was founded the School of Gardening, attached to the National School of Agriculture and Animal Husbandry at Córdoba. The object of this School is to train personnel in practical gardening work. The courses cover a period of two years, divided into four semesters, arranged as follows: 1st semester from April to September, the 2nd from October to March. At the end of two years, the students receive a certificate of Practical Gardener.

By Resolution No 6327 of May 26, 1939, the Oliveros Agricultural School near the National School of Agriculture at Casilda (Santa Fé Province) was established. This School opened on September 18, 1939 with 43 pupils ranging between the years of 13 and 25, and is run on free semi-board lines. Among the subjects taught, mention should be made of general agriculture, aviculture, apiculture, dairying, horticulture, pig-breeding, spinning, etc. This School has a flock of selected poultry with the relative housing installations, thus enabling the students to carry out practical studies, work and experiments, as for example, natural and artificial incubation, breeding, etc.

On April 15, 1940, the new School of Fruit Cultivation and Oenology at San Juan (San Juan Province) was inaugurated, as also the first modern press mill for olive oil extraction in the Province, installed in this school.

## Projects for the establishment of new schools

In 1939, the Division of Agriculture, on the proposal of the Animal Husbandry Board of the Division of Agricultural Instruction, elaborated a project for the establishment of a School for Sheep-breeding in the territories of the South and South-West of Buenos Aires Province. This School similar to those in Australia and New Zealand, supplements the work begun by the Institute of Wool Research and by experiment Stations, in training competent specialists in the breeding of sheep.

In 1939, the Division of Agricultural Intruction, by order of the Ministry of Agriculture, drew up a plan for the creation of a School for Butchers. The necessity of this school for the training of personnel capable of managing, slaughterhouses on an economic, hygienic and technical basis is evident as meat is one of the chief commercial products from Argentine stockbreeding.

In 1940, the Division of Agricultural Education took over the operation of the experiment field of 149 hectares at Lincoln. In 1939, Technical Inspector SEGUNDO E. HEREDIA, agricultural engineeer, was requested to draw up a plan covering improvements and eventual reparations as well as staff requirements. This work forms part of the initial program regarding the formation of the future Lincoln School of Agriculture.

The Division of Agricultural Education decided in 1940 to establish a Practical School of Agriculture and Fruit-growing at San Nicolas (Buenos Aires Province) for the training of professionals specialized in this branch of production which is very important in this zone.

In December, 1939, the Division of Agricultural Education commissioned Inspector JOSE G. RIVAS, agricultural engineer, to ascertain the possibility and importance of the establishment of the Mariano C. Unzué School of Agriculture at Bolivar (Buenos Aires Province). It is a question of the land donated for the purpose by Sr MARIANO C. UNZUÉ, where the establishment of a School of Agriculture or Agricultural Centre is contemplated.

The Division of Agricultural Education also intends to establish a Practical School for Citrus growing and Dry-farming at Quines (San Luis), another for fruit-growing and animal husbandry at San Rafael (Mendoza) and a Farm School at Concarán (San Luis).

In 1939, several deputies presented before the Argentine Parliament bills now under study by different commissions nominated for the purpose; these bills regard the establishment of numerous schools in the various branches of agriculture.

On July 21, 1939, a bill was presented for the establishment of a Farmers' School at Villa Lujan (San Luis). On August 4, there ws another bill for the creation of a Practical School of Fruit-growing and Industrial Transformation at Coronda (Santa Fé). On August 9, a bill for the establishment of an Experiment Colony-School at the Gándara ex-nursery (Buenos Aires). On August 16, a bill relative to the founding of a School of Arts and Trades, theoretical and practical Instruction applied to Agricultural Industries at Federación (Entre Ríos). On August 24, a bill for the establishment of a Practical School for Rural Industries at La Cocha (Tucumán) On September 1, a bill for the establishment of a Regional School of Agricultural Work on the same principles as those adopted for the Osvaldo Magnasco Fruit-growing School at Dolores (Buenos Aires). On September 28, a bill for the founding of Schools for the spinning and weaving of Natural Silk, in the capitals of the Provinces of San Luis, La Rioja and Catamarca, under the control of the Ministry of Agriculture.

## Activity of agricultural schools

An organized program has been elaborated with a view to standardizing the activities of the different schools of agriculture in the country so as to obtain the maximum results as regards the popularization of agricultural knowledge and modern methods among the mass of Argentine farmers.

These activities particularly regard the following points: (1) vulgarization of agricultural knowledge by means of local journals and periodicals in which the technical personnel of the schools would treat on agricultural, stockfarming and industrial questions of present interst; (2) lectures in the premises of the district agricultural associations as well as lectures on the wireless on agricultural and stockfarming questions. In general each school will give about ten monthly lectures; (3) active cooperation in travelling exhibitions of the Ministry of Agriculture with various stands of instructive matter and products for practical demonstrations on different subjects. Each school with collaborate and participate in the exhibition trains which travel through the different localities of the province in which the school is situated; (4) meetings of the farmers for the 'Agricultural Weeks' during which will be treated all problems regarding the vegetative and industrial cycle of an important agricultural product of general character or regional importance (cereals, selected seed, apiculture, fruit-growing, dairying, crop protection, agricultural instruction 'Day', honey, etc.); (5) periodical visits of the students attending the agricultural schools to model farms and industrial establishments; (6) practical courses in pruning, grafting, creation of hybrids on completion of which a certificate is granted; (7) courses for agricultural professors to enable them to teach in the most effective manner the knowledge adapted to the environment in which their pupils live; (8) practical demonstrations for farmers given in the schools; (9) close and effective collaboration with other centres and private institutions, lectures on the wireless and consultations.

## Activities of the Division of Agricultural Education

The Division of Agricultural Education is attached to the Ministry of Agriculture and is at present under the direction of Sr. G. GUILLERMO R. AUBONE, Agricultural Engineer.

The Division sees to the technical and administrative inspection of technical, practical schools, schools in the making, extension instruction, zootechnical inspection of schools, statistics, and map-making, inspection of private schools, agricultural libraries, etc.

In 1939, it was decided to establish in all the agricultural schools 'study fruit orchards' (Huertas frutales de estudio) to be used for experimental work on the species and varieties most suitable from the commercial viewpoint which may be cultivated in the zone in which each school is placed, and also on the best stocks for each variety. This program of experimentation makes it possible to direct fruit production towards the most profitable solution for the grower and the general economy of each zone. The plants to be tested will have the same origin for each variety, so as to obtain comparative results between the different regions of the country.

The Division of Agricultural Education, considering that research should form the basis of ragional instruction in agriculture and animal husbandry, has reorganized the agricultural stations attached to the schools, where experiments will be carried out in collaboration with the different Sections of the Ministry of agriculture specialized in research work.

The highest individual outputs obtained in the schools of agriculture will be compared and analyzed by the Ministry of Agriculture with those of other model establishments in the Argentine Republic.

In 1939, comparative experiments were effected on 22 varieties of lucern in the Schools of Casilda and Bell-Ville, and on rye, barley and forage wheat at the Tandil School. This program was completed in the spring of 1940 by the organization of comparative experiments on lucern at the schools of 'Las Delicias' Córdoba, San Juan, Mendoza, Tandil and Olavarria, thus rounding off the official network of comparative experiments on lucern that the National Forage Commission and the Divison of Agriculture took much pains in organizing.

At the end of 1940, in all the agricultural shools a 'Cultural Athenaeum' was established with a view to improving the general culture of the students. Weekly meetings are held among the students during which previously arranged subjects are discussed.

According to a propaganda program begun by the Ministry of Agriculture, the products obtained in the schools of agricultural instruction will be exhibited at the Trade Museum of Philadelphia (U. S. A.). Over 70,000 students visit this Museum annually; weekly lectures, *inter alia*, are given.

## Organization of the central library and specialized libraries of the Ministry of Agriculture

By Resolution No 11 780 of January 22, 1940, a Commission composed of the Director General of Agricultural Education and those of Animal Husbandry, Agriculture, Plant Protection and the Director of the Central Library was nominated. This Commission had to draw up a program for the organization and functioning of the libraries under the control of the Ministry of Agriculture.

The program proposed by the Commission contemplated a series of measures intended to establish a close coordination between the services of the central library and those of the specialized libraries, by suggesting the creation of an organization which would exercize a special supervision and would contribute towards increasing the efficacy of each library under the Ministry of Agriculture.

This central organization will be under the direction of a functionary competent in the subject, advised, as regards technical questions, by a permanent Commission composed of three Chiefs of Section.

In the project presented, study is also made of the importance of centralizing the sources of information and bibliographical consultations on questions connected with the activities of the Ministry, by proposing the preparation and publication of a general catalogue which would comprise all the publications at the Ministry and the periodical publication of Bulletins in which further acquisitions would be indicated. The central organization contemplated would also have the task of registering as much bibliographical material as possible, making cards for the most important works published in the country and abroad or those which already form part of the libraries under the control of the Ministry, with a view to facilitating, when requested, the obtainment of up to date information on any agricultural, zootechnical or industrial subject.

# THE PROGRAM OF THE UNITED STATES SOIL CONSERVATION SERVICE

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*In this article, the fourth of a series on soil conservation, the program of the United States Soil Conservation Service is explained by its Chief. After a short historical introduction dealing with the creation of the Service and its place amidst the agencies of the Federal Government, the action on five different fronts: research, surveys and mapping, information and education, direct assistance to farmers, land purchase and development, is treated briefly in order to show the part played by each of these branches in the total program. Soil conservation research and control measures will be dealt with more fully in two other articles to be published in the next numbers of this Bulletin.*

*The organization of an efficient soil conservation service has to take into account the existing constitution and laws of the respective country. In the special case of the United States, the fact had to be considered that the Federal Government is limited in the exercise of its granted powers and that the 48 states have a large measure of legal autonomy. A special article on this aspect of the problem is given contemporaneously in the Monthly Bulletin of Agricultural Economics and Sociology.*

## History

Although soil erosion was causing economic loss to American farmers within a hundred years after colonization, there was little interest in erosion prevention and control methods until the past generation or two. George Washington, Thomas Jefferson, and other 18th century leaders pointed out the dangers from continued soil washing and even suggested innovations in farming methods to counteract the process. Such early conservationists were rare, however, and apparently even their neighbours took little cognizance of their warnings and advice.

Around the end of the 19th century, individual agriculturists here and there began to make their influence felt as they demonstrated the advantages of various conservation farming methods. P. H. Mangum, a North Carolina farmer, invented a new type of terrace, with a wide base, so that the entire terrace could be cultivated. Others extolled the benefits of grasses, of tree plantings, of legumes and cover crops, and of controlled grazing.

By 1907 a 'conservation movement' was under way in America which urged that all such public purposes as the control of waterpower development, the protection of forests, and the preservation of wildlife, be considered in the light of a single national conservation program. But not until 1930 did the Federal Government assume its share of responsibility for the conservation of

America's soil. There had been earlier efforts to control erosion on Government-owned lands, but the great bulk of the nation's land resources was privately owned and under no Federal conservation policy. In 1929 the Department of Agriculture established a number of erosion experiment stations in major agricultural regions of the country to conduct fundamental research into the causes of erosion and to develop and test corrective practices Four years later a Federal Soil Erosion Service was established as an emergency, action agency to inaugurate a nation-wide erosion control program. In 1935 a Soil Conservation Act was passed by the Congress, creating a permanent Soil Conservation Service. This new organization absorbed the earlier Soil Erosion Service and in addition took on many of the erosion control activities of the Federal Government which had been assigned to other agencies As the research work begun in 1929 and the activities of the original Soil Erosion Service were continued without interruption by the new establishment, no further distinction will be made here between the work of the Soil Conservation Service and the agencies which preceded it

## Federal Soil Conservation Program

The Federal soil conservation program as administered by this Service consists of simultaneous action on five different fronts

(1) Research.
(2) Surveys and mapping
(3) Information and education
(4) Direct assistance to farmers
(5) Land purchase and development.

These five lines of work are not arranged in sequence either of time or of importance.

## Research

. The research work of the Service will be discussed at length in a subsequent article, and it is only necessary to touch upon it briefly here. The purpose of soil conservation research is to examine scientifically the causes, types, preventives, results, economics, and history of soil erosion and related matters. As new facts and methods are proven by research they are put to practical application on the land. As new problems or ideas are discovered in operations, they are submitted to research Due to the complexity of factors affecting the conservation of soil and water, the field of research on the subject is virtually unlimited

Historically, one of the first and most significant undertakings of the Service was a rapid reconnaissance survey of the nature and extent of soil erosion over the entire country. The seriousness of the erosion problem as revealed by this survey was startling even to those well acquainted with the subject. It was learned that out of a total land area of 1,903,176,620 acres in the United States, 282,218,000 acres had been so severely damaged by soil erosion

that their further use for crops or grazing was economically unfeasible; that 775,678,000 acres had become so seriously eroded as to require immediate control measures to insure continued productivity, and that 144,768,000 acres were wastelands, roads, and other land of no agricultural value. The results of this survey, published in 1935, had a pronounced effect in creating public interest in the problem of soil losses.

### Surveys and mapping

The principal purpose of the regular survey work of the Service is to supply an inventory of all physical and economic data essential for the proper planning of conservation activities in a particular area. The physical features of the area are indicated on an ingenious type of map, developed by the Service for this purpose. Soil types, slope, present land use, degree and nature of erosion, and potential land use are shown on accurate base maps and on a scale large enough for individual farm planning. The base maps are made from aerial photographs by a process which makes possible extreme accuracy with a minimum of ground control The Soil Conservation Service was one of the first agencies to undertake accurate topographic mapping by aerial photography on an extensive scale Its cartographic experts have perfected new techniques and instruments which have helped improve the science

### Information and education

Informational and education work has been and important concern of the Service since the primary object of the Soil Conservation Act is to conserve *privately-owned* land. As the law does not compel landowners to control erosion and as no immediate material gains are promised, the success of the soil conservation program depends upon the voluntary adoption of conservation farming measures by a large majority of farmers and ranchers. Voluntary adoption of conservation mesures obviously must be preceded by an awareness of the need for erosion control and the other elements of conservation farming There are even yet some landowners who regard gullying and other symptoms of soil damage as inevitable or as the result of factors over which they have no control. Also there is a tendency to underestimate or disregard erosion damage until it has progressed almost to the point of irreparability. And there are still persons who do not understand the conservation program, believing it to be some sort. of ' regimentation ' or other distasteful system of regulation These and other similar obstacles must be overcome by education if conservation farming is to spread over most of the nation's eroding land.

The Service informs the public of ways and means of controlling erosion, of conserving moisture, of protecting reservoirs from silting, and related matters. It also reports to the public the results of research, the progress of conservation activities, and any other worthwhile and interesting facts bearing upon the subject of soil conservation. Generally, the same mediums are employed for both educational and informational work, though the method of use may vary. News-

papers, radio broadcasts, bulletins, motion pictures, posters, lantern slides, film strips, exhibits, lectures, demonstrations, and tours, all play a significant part. Many individuals, clubs, and societies conduct educational work of their own which directly or indirectly assists the Service.

### Direct assistance to farmers

The bulk of the Service's resources of manpower, equipment, and money is used to assist farmers directly in conserving their soil and water. The whole theory of the Federal soil conservation program is that the great majority of farmers do not have the technical knowledge necessary to make a successful change from unplanned, wasteful use of the land to planned, conservative use.

Since the beginning, the Soil Conservation Service has proceeded on the basis that erosion can be controlled adequately only if every acre on the farm, or within a watershed, is treated according to its needs and inherent adaptabilities This means that cultivation is confined as far as economically feasible to the more nearly level parts of the farm The steeper areas, the gulled places, and the other sources of most serious erosion danger are kept in permanent pasture, meadow, or forest. In the end the conservation farmer has an arrangement of cultivated fields, pastures, meadows, woods, waterways, and stock ponds that fits the actual lay of the land, the climate, and the character of the soil and, as nearly as possible, the economic situation of that particular farm

But this is only half the conservation program on the individual farm. Once the farmer seeking to control erosion has established a sound basic pattern of soil defense and land use, he applies specific treatments to every acre again in accordance with the needs and adaptabilities of the land. Croplands, for example, are nearly always farmed in rotation, usually on the level, and often in contour strips Terraces are frequently built to provide further protection. Pastures are limed, fertilized, and contour furrowed to improve the growth of grass. Gullies are sloped down, planted to permanent cover, and sometimes stabilized with small soil-holding dams. Woodlands are fenced, where necessary, to keep out livestock, protected from fire, and harvested so as to insure a constantly vigorous stand of timber. On range lands, conservation work takes a somewhat different form. Where the original grass cover has been thinned out by overgrazing, the size of flocks and herds is cut down to a number the range can safely carry. Structures are built to store up the rainfall and spread it over the land where needed. And these are only a few of the dozens of practices now being employed The specific kind of conservation treatment varies to meet the peculiar conditions. But always it consists of practical, workable methods that have been tried and proved practical in thousands of fields.

This method of complete ecologic farm adjustment usually requires a survey of the entire farm by an expert on erosion and soils, a study of farm operations by one skilled in farm management and farm economics, and planning of various measures and practices for the control of erosion and the proper utilization of moisture. Farm planning may require the joint effort of engineers, agronomists, foresters, and biologists. Putting the plan into effect may require

the building of terraces, dams, water diversion ditches, and other structures requiring supervision, labor, heavy equipment and materials. New crop rotations, contouring, strip cropping, and cover cropping may be needed. Fences and farm roads may have to be relocated. Seeds and plants may have to be obtained for starting permanent pastures, woodlots, or windbreaks, or for vegetative control of gullies and other serious problem spots. All these things point to the need for direct government assistance.

At first, the Soil Conservation Service made this assistance available to farmers through projects in selected areas located in representative farming regions of the country. The project areas usually consisted of watersheds averaging about 25,000 acres in size.

In setting up these demonstration projects, the first step was to obtain a base map of the entire area. If such a base map was not already available, one was made, with the use of aerial photographs. Then the area was surveyed, farm-by-farm and soil types, erosion conditions, slopes, current land use, and other pertinent features were indicated on the base map. Using the map as a guide, technicians of the Service drew up individual farm plans for each farmer in the area who was interested in adopting a conservation system. Land-use adjustments, cropping changes, improved tillage methods, and structural devices were discussed with the farmer, usually on the ground. Every step was considered on the basis of need, adaptability, practicability, economic feasibility and physical relationships with adjacent lands.

If the farmer desired to adopt the conservation plan finally worked out, he signed a cooperative working agreement with the Federal Government. He agreed to follow the recommended land-use practices over a 5-year period and to contribute as much as possible in the way of labor, power, seed, and materials toward the establishment of an affective conservation system. The Government agreed to lay out the work, to draw up the necessary structural specifications, to provide whatever labor and materials the farmer was unable to supply, and to furnish suitable planting materials for lands taken out of cultivation because of their highly erodible character.

## Work of the Civilian Conservation Corps

From the beginning, the Soil Conservation Service had the assistance of a large number of Civilian Conservation Corps camps. These Government work camps for unemployed young men did construction work, tree planting, forest improvement, gully control, and other jobs requiring considerable man power and the operation of heavy equipment. The Works Projects Administration, the Government agency which furnishes employment on public projects for needy people, also supplied labor and equipment operators in the early days of the program.

These earliest projects were demonstrations, intended to furnish an opportunity for farmers in the locality to view conservation methods in actual application on the farm. Farmers could see how various measures and practices functioned and could appraise the advantages of planned use of the land. The

demonstration projects also were valuable proving grounds for the various types of control methods employed. This function was quite important, as operations had to proceed simultaneously with research.

After the demonstration projects had operated successfully for several years, the Service launched upon its broader, more extensive program – the program to which all previous work had been the prologue

## Federal and State legislation

The Soil Conservation Act of 1935 provided that the Secretary of Agriculture might require the Soil Conservation Service to confine its work to States that passed laws of their own providing for an acceptable soil conservation policy. In response to requests from State and other agricultural leaders, the Department of Agriculture drafted a model law, embodying all the features which the Department considered essential for State legislation to carry out the purpose of the Act

Copies of this model law were sent by the President to all the State governors for their information and guidance in drafting soil conservation laws for their States This was in 1937, and by March 31, 1941, the governing bodies of 41 of the 48 States had passed laws substantially similar to the model

These State laws all provide for the establishment of soil conservation districts, as separate local units of self-government With few variations, the procedure outlined is the same in all States.

## Formation of soil conservation districts

If a sufficient number of farmers in a locality desire to form a district to secure governmental assistance in conserving soil and moisture resources, they may submit a petition to the State soil conservation committee The committee then conducts public hearings in the community to determine whether a district will be feasible. If the hearings indicate that the district will be practicable and worthwhile, the State committee will call for a referendum of all the farmers and other land operators within the boundaries of the proposed district to determine whether a majority of them favor the idea. If the vote is favorable, the State committee grants the district a certificate of organization and it is ready for the election of officers A board of supervisors, usually consisting of five members, is elected by the farmers from among themselves. This board is the governing body of the district, with power to represent the farmers of the district in dealing with other agencies and levels of government.

The first business of the district is the preparation of a program and a work plan. The program is a statement of the objectives the district proposes to attain, the work plan is a statement of the methods and means to be employed in attaining them. To use a military parallel, the program contains the 'strategy' of the district, and the work plan contains its 'tactics'.

At this stage, the district many enter into a memorandum of understanding with the Federal Department of Agriculture, under which the Department

agrees to furnish the district whatever assistance it is able to render in carrying out the district work plan.

The district supervisors invite farms within the boundaries of the districts to enter into cooperative agreements with the districts. These agreements are between the farmer and the district supervisors—no Federal agency is a party. Under their terms, the farmer agrees to follow a long-time plan of conservation farm operations. He agrees to furnish certain equipment and materials, and to do certain operations himself No compulsion is used, and no subsidies or rewards are offered other than the improvement in his farm as a result of the change to conservation farming. Normally, however, he can expect the assistance of technicians of the Soil Conservation Service in developing his conservation plan

The farmer, in working out his farm plan in cooperation with these trained men, gives consideration not only to the physical characteristics of the farm but to the economic factors involved. Service technicians also recognize that the purpose of farm planning for conservation is first of all to benefit people, and if the farm plan conserves the soil without benefitting the people, it is a failure. On the other hand, if the plan benefits the people without conserving the soil, it is a failure from the soil conservation standpoint The perfect conservation farm plan, them, is the one that most successfully conserves soil and water and at the same time provides for the greatest material return to the farmer.

After the farm plan has been developed and accepted by the district supervisors, the Soil Conservation Service may assist the farmer is putting it into practice He may be given planting stock and seed, if available, for planting gullies, new pastures, and permanent hay crops. He may be furnished skilled supervision and labor in installing or erecting difficult structures, such as terraces, dams, and diversions Thereafter, trained soil conservationists may visit his farm regularly to see if the structures and practices are functioning properly. The farm plan and the various conservation measures and practices will be subject of a subsequent article.

With the assistance made possible by soil conservation districts, farmers can prevent the loss of soil from their *own* land. But, in addition, they sometimes need protection from the washing and blowing of adjoining land. In cases of this sort, the district has the authority to enact, with the favorable vote of a specified majority of its members, compulsory land use regulations. These regulations prohibit one man from using his land in such a careless or improper way as to cause damage to adjoining land. As long as misuse of the land affects no one but the owner, he can do as he pleases. But as soon as his neighbors are affected, the land use regulations may be invoked to compel him to remedy the source of the trouble.

At the present time, there are nearly 500 soil conservation districts in operation, embracing about 300,000,000 acres. At the present rate of district organization, practically all the farmland of the country needing treatment will be within soil conservation districts in ten years.

Different districts have different problems. Since the purpose of districts is mainly to conserve soil and water for a more permanent, prosperous agri-

culture, the problems of eroding land and of wasteful use of water are common to all of them. Sometimes, though, other problems closely related to those of land use require solution. In some cases, farms are too small, or perhaps many of the farmers do not own their farms and their tenure of the land is too uncertain to permit them to make an investment in conservation. Perhaps marketing conditions for farm products are unsatisfactory. Perhaps low incomes necessitate exploiting the soil. To help remedy such conditions, the soil conservation district may enter into agreements with government agencies—Federal, State, or local—or even with individuals and corporations to help reach a solution to these problems.

### Land purchase and development

The Soil Conservation Service can also help in other ways than those mentioned above. It may purchase land which is so unproductive or eroded that it can no longer be economically cultivated. This land is retired from cultivation entirely and is usually developed for recreational use, wildlife sanctuaries, forest reserves, or some similar public purpose. Some lands are planted as permanent pasture, and after several years of careful treatment, farmers and ranchers are allowed to use them under lease for managed grazing. About 13,000,000 acres of submarginal agricultural land have been purchased for development in this way during the past five years.

In the arid and semi-arid agricultural regions of the western United States the Service cooperates with other bureaus of the Department of Agriculture in the development of water utilization and storage facilities, such as wells, farm ponds, pumps, storage tanks, and so on.

Under the present policy of the Federal Government in regard to flood control, the Service assists other Governmental agencies in the planning and treatment of stream watersheds to retard and conserve runoff water as a means of reducing flood crests.

The Service also participates in programs of farm forestry development and repair and reconstruction of sediment-filled drainage works.

Thus, in one governmental agency are combined the responsibilities for the research work, the education work, the survey work, and the actual treatment of the land necessary to carry out a complete program of soil and water conservation. The technical staff of the Service consists of engineers, agronomists, economists, soils experts, foresters, biologists, land appraisers, in fact men with all the special types of training necessary for a proper ecological approach to the problem. The search for the causes and cures of soil and water loss takes the Service into virtually the entire field of agricultural knowledge. Decentralization of field work into ten regional organizations covering the nation permits concentration on the problems and solutions peculiar to the wide variety of geographical and agricultural situations encountered. This type of organization permits mobility and concentration of resources comparable to that of the modern army. It accounts in no small part for the splendid progress that has been made in such a short time.

# STANDARDIZATION OF FRUITS AND VEGETABLES

Ir. F. L. K. VAN DER KLOOT MEIJBURG

*Following the article published in this* Bulletin (*No. 5, 1940*) *on the standardization of horticultural products in Italian East Africa and Germany, this study referring to Belgium, Chile, Cyprus and Denmark has been based on the information and documentation furnished by the authorities of the countries in question.*

## 3. Belgium.

1. - In Belgium, standardization measures have been adopted for the following horticultural products. cherries, strawberries, chicory or 'witloof', cauliflowers, potatoes, asparagus and tomatoes.

For the home market, standardization is applied to strawberries, chicories, cauliflowers, potatoes, asparagus and tomatoes, for the export trade, cherries, 'witloof' chicories and potatoes.

Standardization is contemplated for azaleas and begonias.

2. Standardization measures are based on the current commercial qualities of the species and varieties cultivated in the country.

Cherries, sweet cherries, bigaroons and egriot cherries are divided into two grades (1) fruits intended for consumption in the fresh state which should be firm, ripe, sound and have the stem attached, (2) fruits intended for industrial and culinary uses which should be sound but which no longer need be sold with stalk attached.

Strawberries should be sound, intact and meet certain requirements as regards ripeness and cleanness and must not be washed. Three grades are distinguished:

(*a*) Strawberries sold in boxes of different sizes must have a uniform weight.

(*b*) Fruits sold by weight are classed as table fruit and as canning fruit. The different lots of table fruits must belong to the same category and present a uniformity in weight within certain prescribed limits, exception being made for the so-called 'wild strawberry'; fruits for preserves, canning, etc., comprise all small or malformed fruits, with or without peduncle.

(*c*) The third grade comprises fruits which do not meet the requirements of the first two classes and can only be sold if labelled 'not garanteed'.

Brussels chicories or 'witloof' must be sound and meet certain requirements as regards colour, aspect and cleanness. For the export trade they have to be graded according to length and size. For the home market, an extra quality, a first quality and finally a 'not guaranteed' quality (see strawberries) are distinguished.

Cauliflowers are divided into a 'commercial grade', where the heads, clean, sound, firm and white, are grouped into lots of the same diameter, and into a 'not guaranteed' quality (see strawberries).

Tomatoes are also divided into a 'commercial grade' and a 'not guaranteed' grade.

Potatoes should be free from black wart disease or other diseases considered dangerous, and from green tubers; only a certain percentage of impurities or spoilt tubers is allowed and the potatoes must have a minimum diameter varying according to whether they are early tubers sold between June 1 and 30 or others sold between July 1 and May 30.

Asparagus should be free from parasitic attack and is graded into three qualities. The first comprises asparagus sold in bunches; these bunches must be of a certain weight and the asparagus fulfil certain conditions as regards length, diameter, shape and colour. The second quality comprises asparagus sold loose and by weight, for which regulations are not so severe as in the case of the first quality. Third quality asparagus may only be sold if labelled ' wastage '.

3. -- The packing for cherries and ' witloof ' chicories intended for export is standardized. Also the use of a special label or control seal guaranteeing the Belgian origin and conformity of these products to the legislation in force is required.

Standardized packing is also advocated for grapes, peaches, strawberries, tomatoes, potatoes, pears, plums, different currents and raspberries.

For cherries, sweet cherries, bigaroons and egriot cherries, use is prescribed of new slatted wood baskets holding 5, 8 or 10 kg., wicker baskets holding 5 or 10 kg. or platted wood baskets holding 8 kg. net.

As regards strawberries, in no case may they be packed in newspaper or other used paper.

' Witloof ' chicories are packed in wooden boxes, pasteboard boxes or baskets of the required size or weight. The packing paper used must be blue in colour. The utilization of printed paper or other used paper is prohibited.

In regard to the above prescriptions, the utility of always presenting each quality in the same way is seen, whether use is made of different coloured wrapping paper (pink, yellow, white or blue) or whether quality is indicated by numbers (1, 2, 3, 4....). The used of numbers is to be preferred to that of coloured paper, as not every fruit stands out well on some colours.

4. — Standardization is compulsory for the sale on the home market of strawberries, ' witloof ' chicories, cauliflowers, potatoes, asparagus and tomatoes, and for the export of cherries, ' witloof ' chicories and potatoes.

Standardization is partly regulated by the Government. According to the trade requirements of each product in question, regulation was imposed at once or else gradually, but in each case, a period of adaptation was found necessary.

Standardization measures are based on the Royal Decree No. 111 of February 26, 1935, modified by Royal Decree No. 198 of August 23, 1935.

These measures were decreed after counsel had been taken with the Commissions composed of representatives of the producers and merchants concerned.

5. — Observation of standardization regulations is checked by supervision of the markets, shops, landing ports and dispatch stations and the customs of fices charged with examining export consignments. Supervisors have been designated by virtue of the aforesaid Royal Decrees. This inspection is in part organized by the Government. The collaboration of the Association for the marketing

of agricultural and horticultural products is necessary for the issuance of certificates, labels, and check seals for the products for which standardization is compulsory.

No appreciation is granted to the producers or merchants concerned when their produce conforms to the legal regulations applied.

In the contrary case, the necessary indications and advice are given to the interested parties and eventually the sanctions provided for by the law are applied. Moreover, when the merchandise, the export of which is subject to regulation is not found conformable, the inspection certificate which should accompany it is refused and the consignment in question is rejected The reasons for this step are made known to the interested parties.

6. — The quality of the products for which standardization is compulsory has benefited considerably Standardization measures, for example, have had a favourable effect on the price and export of 'witloof' chicory.

An improvement, although less pronounced, has been remarked in other products for which standardization was only recommended or else only imposed in the case of selling on the home market

7 — Foreign imported products come under the legislative measures applied to similar national products They may only be sold, however, in their original packing For retail sale, they must be labelled with the name of the country of origin and the words 'Foreign product'.

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## 4 Chile.

I. — In Chile, standardization measures have been applied to the following horticultural products:

Apples (fresh), dried fruits prunes, duracines, apricots, sweet cherries, apples, pears, quinces, raisins, figs, almonds in shell, hulled almonds, walnuts in shell, hulled walnuts, preserved fruit: canned and bottled fruit, marmalades, conserves, stewed fruit, candied fruit, fruit confections, fruit purées, potatoes, onions, garlic, tomatoes; conserved vegetables canned vegetables, canned tomatoes, achar, wines.

Besides these products, wheat, oats, barley and maize have been standardized as also, it is reported, some medicinal plants which are exported.

The standardization of the above-mentioned products is only compulsory if they are exported; for the home market, no legislative measures are in force.

Grapes and ligneous products are not yet standardized but their standardization is contemplated. The Ministry of Agriculture has maintained a steady propaganda campaign with a view to encouraging the voluntary standardization of fruits when it has not been made compulsory.

2. -- Apples (fresh fruit) are divided into three qualities: each has to comply with certain conditions as regards method of harvesting, variety, weight, cleanness, shape, size, ripeness, damage to fruit, colour. The last-mentioned is judged by comparison with colour cards. The first grade is distinguished from the other two in that any fruit having the slightest defect is rejected while with grades 2 and 3, slight variations are allowed.

The different dried fruits have to meet the following requirements: Prunes are graded into three classes, the characteristics of which regard quality, variety, external aspect colour, weight, diameter and moisture content. The same applies to sweet cherries.

In the first class, no allowances are made, in the second only slight allowances, while in the third, fairly wide variations are tolerated.

Duracines are divided into three categories, according to whether they are peeled and stoned; peeled, stoned and halfed; simply peeled. Each category is sub-divided into four qualities.

Apricots are graded qualitatively in the same way.

Apples and pears are divided into three grades. Quinces are only divided into two grades. Raisins are divided into varieties for home consumption only and varieties for export. The latter are divided into three classes. Two qualities are distinguished for figs intended for export. Unshelled almonds or shelled almonds for export are divided into three classes. The two first classes must satisfy very high standards. The third class does not come up to these standards. The deviations from standard allowed, however, are limited.

Unshelled walnuts are divided into three qualities, unshelled walnuts into two qualities only. The standards to be maintained regard variety, harvesting, shell leavings, splitting into halfs or quarters, regularity of size, etc.

Fruit preserves may only be manufactured in the factories having received authorization to that effect from the Director General of Public Health; authorization is only granted after inspection of the hyigienic conditions of the premises, the machinery and other installations, and the staff employed.

Inspectors of the control stations under the Department of Public Health, are authorized to carry out verifications. The material employed, the fruit, sugar, colouring or antiseptic matter, etc. is under very stringent control.

There are four qualities of fruit preserves and lastly, fruit pulp. These qualities in turn are sub-divided according to the process of conservation adopted.

Conserved vegetables have to comply with similar standards and are divided into the same qualities.

Potatoes, onions and garlic are graded into three categories while there are only two for tomatoes.

Wines are grouped into four qualities according to age, type, etc.

3. — The packing of the above-mentioned products must comply with certain conditions or else be standardized. The wood used for the cases should be white and smooth. The inside of the case must be lined with oiled paper. For packs, pasteboard and tin and for some products, sacks, may also be used. These also have to to comply with special regulations.

When the different lots are grouped their collective packing is also subject to certain rules the number and weight of the lots must be indicated clearly on one side of the pack The labels attached to the packs must indicate clearly the nature of the product quality net weight size address of producer or exporter as well as the address of the consignee lastly the word Chile or Product of Chile'

These regulations only apply to products intended for export For the home market the only obligation is that resulting from Law 3915 of the labour code which decrees that sacks carried on the back by labourers must not weigh over 80 kg

For wine consignments regulations regarding bottles caps and corks have to be observed Baskets and cases for the packing of bottled wine have to comply with certain standards as regards size content and weight There are also regulations applying to the labelling of the bottles and other packs

4 All the above measures referring to the standardization of products and packing are compulsory These measures are decreed by the Government The provisions were introduced at once and have undergone little change since All the prescriptions are based on Law No 4472 of November 24 1928 denominated Reglamento General del Servicio de Control Comercial de Exportacion

5 In Chile there are private organizations of plum apple and pear growers These organizations keep strictly to Government regulations Supervision is carried out by inspectors of the Department of Agriculture and also of the Department of Foreign Affairs and Trade Excise duties are levied by the two Departments the exporter obtaining an export certificate if the goods prove up to standard The two taxes are collected one at the packing shed the other at the point of shipment

If the product does not come up to standard the exporter may obtain authorization to again grade the product in question or to eliminate in some other way the cause of rejection for export after which the necessary certificate may be granted

The port representatives of the organizations communicate the results of inspection of the products to the interested parties

6 Standardization has contributed considerably towards improvement in the quality of vegetables and fruits

7 Standardization regulations do not apply to imported product insofar as regards packing and grading but there are measures in force for the protection of public health in virtue of which imported products are subjected to examination

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## 5. Cyprus.

1. — At Cyprus standardization measures have been applied to citrus species: bitter oranges, grapefruit, tangerines, lemons, oranges; to potatoes and onions.

These measures apply solely to products for export. Standardization, however, is not compulsory for exports to all countries, but only in the case of the following: Belgium, Denmark Finland, France, Germany, the Netherlands, Iceland, Norway, Sweden and the United States.

The application of standardization measures to other products is contemplated.

2. - Citrus fruits are divided into three qualities according to appearance, ripeness size, colour and freedom of disease; there is another quality for indusstrial use only. The export of any other quality of fruit is prohibited. Potatoes are divided into three categories which must all be free from certain diseases; all three categories must not contain over 1 per cent. admixture of foreign matter and also comply with certain other conditions. Division into three grades is based on appearance, size, maturity and spoilage. Consignments of the first quality may only contain potatoes of the same variety. Besides these three categories, there are seed potatoes which must be sound, of good appearance, not damaged in any way and of a certain size.

The quality of new potatoes is also determined.

Onions are graded into five classes and sub-divided according to size.

Each case of of first and second grade may only contain onions of the same diameter and which must also comply with certain conditions. The third grade may be composed of onions of different size.

Packing is subject to certain regulations. Thus first quality citrus fruits may only be packed in new wooden boxes or crates, of approved dimensions. The second quality may also be packed in wooden boxes; for export to certain countries, however, baskets of different sizes may be used. There is no special pack for the third quality. The quality must be indicated on each case, and for the first and second qualities, also the private mark of the grower.

First and second grade potatoes as also new potatoes must be packed in clean sacks, hampers, crates or wooden boxes approved by the authorities. Grade must be indicated on the pack.

Onions must be packed in well ventilated cases or in sacks of a certain size.

4. — Standardization is compulsory for the export of products to the aforesaid countries and is entirely under the control of the Government. Expenses are covered by a tax levied on exporters in proportion to the quantity of merchandise presented for inspection.

Regulations are revised from time to time.

The Laws and Decrees on which standardization is based are condensed in the Agricultural Produce (Export) Law, 1933 and in the regulations relating thereto.

5. — Control of the application of regulations is exercized by inspectors nominated by the Government. All products must be presented for examination at certain determined points of the island. The inspector will then seal all boxes, cases, etc. and take samples of the product for the purpose of testing quality. If satisfactory, a certificate indicating that the export of the consignment is authorized is granted. If the product is rejected, the inspector advises the exporter and the producer that it must be removed within a certain period, otherwise it will be destroyed at the expense of he who presented it.

6. The quality of standardized products has improved as a result of the regulations enforced.

7. — With a view to preventing the introduction of diseases and pests, the importation into Cyprus of plants, fruits and similar products is prohibited. Exception is only made for import from certain countries The products imported must be accompanied by a health certificate.

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## 6. — Denmark.

1. — Standardization measures have been taken in Denmark for all the horticultural products cultivated; these measures apply to both products for the home market and for export.

2. — All products are divided into a first and second quality and a non-graded quality.

3. — The packing for all products is standardized.

4. — Standardization is compulsory for all products sold by auction, and has been organized entirely by the auctioneers' associations without the intervention of the Government. Regulations were applied completely and at once.

The auctioneers' associations are composed of growers and not merchants.

At the Copenhagen market, however, all the products are sold independently; packing and grading, however, are to a large extent carried out in the same way as in sales by auction. Products coming from the latter and graded uniformly are also sold.

5. — Supervision is carried out by agents nominated by the associations or by the members of the associations themselves.

The results of inspection are communicated to the growers.

6. — The quality of horticultural products has improved considerably as a result of the measures taken

7. — Imported products do not need to be standardized.

# RECENT METHODS OF CLAY CONSTRUCTION

H. J HOPFEN

*A heavy outlay of capital for farm buildings is generally a drawback to the economic success of a farm. Clay constructions are cheap, healthy and durable Frequently, however, their execution is complicated and requires much time. A description is given of the Dunne (Westphalia) method in which undried clay blocks are put into place without mortar. The possibilities of the use of sheetings or casings for pisé construction are discussed.*

Unburnt clay, one of the oldest building materials, has given proof of its utility under the most diverse forms. Today, however, it has little importance, as its composition varies considerably according to locality thus requiring different methods of handling and consequently skilled workmen keeping to traditional systems of building. This difference in composition, therefore, has, in recent times, prevented a greater extension of clay building even in the sphere most suitable for it, *i. e.* the country especially where other building materials, capable of a more general use, were beginning to come to the front, even if they were more expensive and, in many aspects, not any better.

Constructions in clay have many advantages, to a greater extent than buildings constructed with other materials: primarily they provide a healthy housing for man and beast, they assure a good thermal isolation, at the same time being sufficiently porous to allow the air to circulate through the walls so as to prevent the condensation of moisture, especially in stables and sheds; they are fairly well protected against damp and have a practically unlimited duration: today, pisé buildings can still found which certainly date back over centuries.

Clay is the cheapest building material known; no fuel expenses are incurred for firing, an important advantage at a time when or in localities where fuel is

difficult to procure. Moroever, clay can be found everywhere within reach of the farmer, in fact it can usually be obtained on the site of the building itself, thus saving transport costs.

However, to revive clay construction in the country, it is necessary to take the methods of operation out of their narrow local limits and put them on a wider basis. The course to follow leads to (*a*) establishing simple methods of correcting the composition of clays differing according to locality -- (*b*) elaborating construction methods improved from the technical viewpoint and capable of general use.

## I. – Composition of building clay

According to the proportion of clay and sand contained in the material, distinction is made between fat clays, less fat clays and the various transition forms. Fat clays, that is, having a high percentage of clay, give particularly durable walls, but shrinks on drying and tends to crack. Once dry, it is very solid and lasting and does not easily absorb moisture.

Less fat clays, that is having a higher sand content, give a brickwork which does not shrink on drying and is thus easier to build with, but which, on the other hand, is less solid, less durable and more easily affected by dampness.

The qualities of building clay can be improved by modifying the proportion of clay and sand or by adding stones, broken glass, straw, twigs, cattle dung, blood, etc. The important point in this case is to correct the composition of the different clays by means always available in the country, in order to ensure low cost and simplicity in method of construction.

In general, in masonry, clay does not combine easily with other materials, as is particularly shown in the adherence of the rough-cast, as will be seen further on in the article.

As far as is known, no systematic research work and experiments have as yet been carried out on the characteristics of building clay and on the additions to be made to make it as suitable as possible for use in building. Such research should lead to the establishment of simple methods enabling a testing and expedient preparation of the materials used in clay building.

## II. – Usual methods of clay construction

Among the methods employed up to the present, mention should be made particularly of: (*a*) adobe construction (unburnt bricks), (*b*) pisé or rammed earth construction, (*c*) frame-work construction.

With the first method, the clay blocks are either fashioned by hand, moulded or else compressed in a machine and then dried in the open, the blocks are not used for building the walls until completely dry. Clay mortar is used to join the bricks. Drying of the blocks requires time and much care, and, in particular, protection against rain.

In the second method, with pisé, the walls are rammed in wooden sheetings in the same way as with concrete. Only fat clays can be employed in construct-

ing these walls. The clay is usually prepared in the autumn on the site of the building so as to weather the winter and be ready in spring in starting building. With a suitable raw material (very fat clay mixed with inalterable gravel) buildings of 3 and even 4 stories can be constructed in pisé. Much labour and experience is required in making the falsework and in seeing to the framing of the floors and windows

In the third method, first all the frame-work is constructed and then the roof, after which the interstices in the framework are filled with clay walls.

The application of one or other of these three methods and of others again, depends on the availability of suitable clays. These processes are more or less complicated, require much time and before everything, skilled and specialized workmen. After the world war of 1914-1918, when there was a considerable need for new buildings in Germany, without it being possible, owing to shortage of fuel, to obtain sufficient building material, several attempts were made to revive clay construction, even where tradition was lost With one sole exception, which will be discussed further on, these attempts failed to a greater or lesser extent.

## III - Clay construction at Dünne (Westphalia)

The Dunne clay construction method was elaborated during the period 1923 to 1940 through the persevering work of the pastor G von Bodelschwingh, in Westphalia. On occasion of a voyage in East Africa, this pastor learnt about a new type of clay construction method employed on the farm of a colonist named Kraft. In the periodical 'Bauwelt' (Berlin, 1941, No. 15) Herr Von Bodelschwingh writes as follows

" Abandoning moulding and the usual drying of clay blocks (unburnt bricks) Kraft (who had constructed the other buildings in a lobe put into place blocks of the same size as these bricks, but not moulded, not dried and without mortar, the whole was rough-cast with white clay. He had also constructed round and surbased arches with clay blocks without mortar.

Taking into account the special climatic conditions and after having consulted specialists on the subject, at Dunne in 1923 the first experimental building was constructed. To date (1941), it has been followed by 300 others. The main features of the process as it is used today are as follows :

The site of the building should be chosen as far as possible in a place where the clay can be obtained from the field itself or from a locality fairly close at hand so as to facilitate transport. On top of the foundation walls in stone or concrete, an insulating layer is placed, then the roof is mounted on a scaffold and covered; at the same time the stone chimney is built. In houses for one family, the frame of the roof rests on 8 round wooden supports, measuring, on an average, 10-12 cm. in diameter, braced inside and out to resist wind pressure.

The clay, if possible already subjected to the action of winter conditions, is kneaded to a glutinous mass by means of a mobile press which forms it into a band. This is cut into blocks the size of ordinary fired bricks which are put in place in rows. To fix them together, each second layer of blocks is pierced with small tree branches, the axils of which are pressed into the clay. The external walls

are 24 to 36 cm. thick as against 12 to 24 for the interior partitions. To hold the rough-cast, in each block during building, 1 to 3 holes, 3-4 cm deep, are pierced. According to the more or less long duration of drying, depending on wind and weather conditions, two to five layers of clay blocks can put into place a day. The bays for the doors and windows are contrived in the same way as in brick construction and the lintels are made in concrete when the external and interior surfaces of the walls are dry (generally at the end of 4 to 6 weeks), the upper part up to the roof is covered with concrete.

In the substructure and the ground floor, the interstices are filled with the clay obtained with the press mentioned above In stables and stock sheds, use is made as much as possible of the clayed straw of local usage, owing to its particularly marked aptituded for absorbing damp and moisture. The rough-cast is applied first to the interior and then to the exterior surface, but never to both at the same time. On the interior surface of the walls, the rough-cast is sufficiently retained by the gaps which separate the clay blocks and which thus allow a ramified fixation of the rough-cast to the wall. On the external surfaces, the holes pierced in the clay blocks assure the adherence of the rough-cast, which is thus attached to the wall as if by thousands of hooks.

Up to the present, the possibility of employing the Dunne method has been limited to one-storey houses. The erection and, before all else, the propping of a frame for a house of more than one storey come up against technical difficulties; moreover the old method of construction is generally more suitable for one-storey buildings"

In comparing the Dunne pisé constructions (made chiefly with less fat clay) with stone constructions built under the same supervision, Herr VON BODELSCHWINGH comes to the conclusions summarized below.

(*a*) In the long run, rough-cast on earthern walls shows no disadvantage compared with rough-cast on brickwork. As in the latter case, it must be rugose Before winter starts, capillary fissures must be filled up with a coat of milk of lime mixed with a little glue.

(*b*) In a study on thermal insulation rough-casted clay houses showed a slight superiority over rough-casted stone buildings. The saving in coal obtained in winter and the coolness in summer are extolled by those living in clay houses.

(*c*) The pressure resistance of clay walls is naturally not as great as that of walls built of fired bricks. However, even with clay of higher sand percentage, heavy loads can be supported, such as in granaries.

(*d*) The hardness of clay increases as time goes on.

(*e*) For stables and stock-sheds, the exclusive use of clay blocks has been found much superior to that of fired bricks and especially to concrete and cement: in such stables with earthen walls, the air was particularly pure and mild, and free from condensed moisture. In hog-pens, the clay walls must be protected by a casing of wood otherwise the pigs will gnaw at them.

(*f*) The strong cohesiveness of the blocks in dried clay walls which, to be repaired, require double the time and labour necessary for burnt brick walls, raises the question as to how the former would compare with the latter in the case of bomb attack. No experiments have as yet been made in this respect.

(g) The radio-activity of clay, attributed to a certain content of radium, has not yet been studied scientifically; from observations made so far, however, it would be to the favour of clay construction.

## IV. — Conclusion

The Dünne process of clay construction which, based on old methods, opening new paths, may still conceal further possibilities of development in the future. It is not only by scientific research on the composition of building clay, as was said in the beginning, that progress can be attained, but also by simplifying the technique of building.

The construction of the foundation walls which, with the Dunne method, are usually made of gravel concrete require, owing to the necessity of having to make wooden sheetings, expert labour, not always available in the country. In place of this wooden falsework, the use of concrete casing blocks * composed of two thin concrete panels, fastened by inner cross-bars. These concrete casing blocks, easily made, are put into place without any difficulty and filled layer upon layer, with a suitable material, usually gravel concrete, sometimes also clay.

For surface walls, in clay construction it would be possible to develop the plan of considering the casing block as an integral part of the masonry, so as to execute a 'sheeting construction' in which each casing block would be divided into two panels (easily joined by cross-bars), of which the exterior panel would replace the outside rough-cast, and the interior panel the inside rough-cast, with an eventual insulating layer **.

The scaffolding to support the roof during construction consists, in the Dünne process, of a sort of wooden framework. It would perhaps be an advantage to construct the props of this scaffolding in reinforced concrete instead of wood. They could also be made of casing blocks of a suitable form (for example annular, piled one on top of the other and fastened on the inside with iron rods), which could be filled with concrete, layer upon layer. Such props, easily constructed, would also be very useful for the supporting of heavy cellar ceilings.

In the Dünne method, a clay press is used to fashion the blocks for the walls. An adapted construction of this press would contribute considerably to a further improvement in the process. In this respect, it would be important to ascertain the most suitable pressure for obtaining compact blocks, having properties similar to those of pise; another important point is the shape of the blocks: the most practical form would probably be that similar to ordinary burnt brucks. Their dimension, however, should be slightly larger to allow of an easy and simple construction of walls which, according to general experience should not be less than 0.45 m. thick.

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* See, in the *Monthly Bulletin of Agricultural Science and Practice*, 1940, Nos. 7 & 8, pp. 273-276, the article entitled 'Adoption of new technical methods in wall construction for rural buildings'.

** Cf Beton-Wande ohne Holz-Schalung nach dem Furnierbeton-Verfahren. - *Bauwelt*, Berlin 1941 Nr 28, S. 453-455, 14 Ab (On the construction of concrete walls with frames not of wood but concrete panels).

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# MISCELLANEOUS INFORMATION

## School for advanced study in the science of alimentation

A 'School for advanced study in the science of alimentation has been established under the Faculty of Natural Sciences at the University of Rome (Royal Decree, July 17, 1941-XIX, *Gazzetta Ufficiale*, No. 167, p. 2828)

The object of this school is to furnish indispensable instruction on the rational alimentation of children, adults, workers of all categories, and also to supply the necessary knowledge on animal feeding.

The duration of the course is two years The subjects tanght are (1) Food industries; (2) food hygiene; (3) chemistry of food products; (4) historical review and food doctrines, (5) statistics of food commodities, (6) human nutrition, (7) rational feeding for domestic animals; (8) nutritional diseases and deficiencies; (9) dietetics; (10) chemical and clinical diagnostic. The practical work comprises food analyses and testing for adulteration, composition of diets suitable for each physiological case considered, etc. The School will also be able to organize various and specialized courses and lectures in food hygiene.

To be admitted to the School, candidates must have taken their degree in natural science, agronomy, medicine, veterinary science or pharmacy.

After having passed the examinations held at the end of the course on the various subjects and prepared a thesis on a nutrition problem, the candidates receive a 'degree for advanced study in the science of alimentation'.

Thus conceived the School will fill a gap and assure the necessary unity of action in this field. It will also be fully authorized to train specialists in the science of nutrition, enabling subsequent application to food hygiene.

E. L.

## Institute of Vitaminology

To the memory of Prof. G. LORENZINI, pioneer in the science of vitaminology, has been created the Institute which bears his name.

The G. Lorenzini Institute of Vitaminology is centred at Milan.

Its object is to encourage research on vitamins, establish a bibliographic centre of the literature on vitamin science, to found bursaries and premiums for work on vitamins. Special courses and lectures will be given with a view to making known new data en vitamins in nutrition, and study will be made of everything that can possibly be done to improve the health of the people and enable a maximum work output under determined conditions. The detection of early and often little apparent signs of an unwise alimentary restriction and also of defective nutrition, has become a problem of consirable importance today. The establishment of the Lorenzini Institute of Vitaminology will contribute to a great estent towards progress in the field of nutrition physiology.

E. L.

# BOOK NOTICES *

TASSINARI GIUSEPPE, Manuale dell'Agronomo. Roma, Ramo Editoriale degli Agricoltori, 1941, 9000 pp, 400 illustrazioni, 2 tavole a colori. Price 100 lire.

In reality this manual is an agricultural encyclopaedia. Originality in a work of this kind does not consist in the subjects treated therein but in their selection and harmonious equilibrium giving to each the relative importance and place it merits in the ensemble, being restricted to useful facts and indications within the limits of indispensable knowledge, and in their clear and concise exposition allowing of easy consultation and comprehension. This required an expert and attentive guidance, an indisputable competency of the different collaborators and their complete submission to the common objective.

The author, Minister of Agriculture and Forests in Italy was evidently well placed to select both men and subject material Over 80 collaborators contributed towards this manual and work was coordinated by ten experts, among whom TASSINARI makes special mention of Prof Giuseppe MEDICI and Dr Antonio CALZECCHI-ONESTI Going over the result of their common efforts, the reader has to admit that, of its type, the ' Manuale dell'Agronomo' is an excellent work, well got up, of practical and easily handled size, in which all questions are concisely explained, without sacrifying to vulgarizing It is in place in the library of all agricultural engineers understanding Italian and would also be very useful to agriculturists having a certain general culture. A H.

EDELMAN, C H, Studiën over de bodemkunde van Nederlandsch-Indie Publicatie No. 24 van de Stichting ' Fonds Landbouw Export Bureau 1916-1918', Wageningen, 1941, H Veenman & Zonen, 416 pp, Price fl 4 70.

The Netherlands Indies figure among the few tropical countries where soil research has, for some considerable time, aroused the interest not only of the government agricultural organizations but also of the large commercial estates for sugar, tobacco, coffee, tea, etc. The studies and works published in the Dutch colonies have, in many instances, served as a model for research in other countries and colonies This book gives a very complete and comprehensive review of the studies and investigations made up to 1940. It is the result of a tour accomplished by the author, professor of pedology at Higher School of Wageningen, in company with a group of students for the purpose of studying especially the cultivated soils of Java and Sumatra

The author assures us that he has avoided useless repetition of the classic work on the soils of the Netherlands Indies by Prof. E. C. J MOHR, issued between 1933 and 1938 He has, in effect, succeeded in presenting an ensemble of numerous works on pedology or annexed subjects, in a new and complete form, without however, sacrifying easy reading to excessive documentation

The mineral and chemical composition of the soils and their physical structure very naturally constitute the subject matter of the opening chapters, subsequently the factors influencing their formation are studied climate, mother-rocks, topography, plants, animals and man, to assemble in the following chapter the data serving as a basis for a soils system, their nomenclature and for a soils cartography. A long chapter treats on the chief soil constituents potash, phosphorus, nitrogen, calcium. Plantation crops have special requirements as regards soil and fertilizers, thus each of the following crops has been studied separately . rice, sugarcane, tobacco, coffee, tea, hevea, cinchona, oil palm, sisal, cassava, coconut and others, while forests are treated apart. The final chapters deal with soil erosion and conservation, irrigation and also the relationship between phytopathology and pedology and plant selection with regard to the most suitable soils. A bibliography of over a hundred pages will undoubtedly prove most useful.

After having read this book the reader will have some concept of the assiduous work accomplished in the Netherlands Indies during the last century but, at the same time, he will perceive that we are still very far from a thorough knowledge of tropical soils, our present knowledge not even being sufficient to advise planters as regards selection of land or application and choice of fertilizers in each special case. There is still much to be done in this vast and complex field of study. W. B.

* Under this heading are included short synopses of books received for review.

Prof. UGO PAPI, *Segretario generale dell'Istituto, Direttore responsabile.*

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OF

AGRICULTURAL SCIENCE AND PRACTICE

# SOIL CONSERVATION RESEARCH IN THE UNITED STATES

by

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*Prior to 1929, little was known of the process of soil erosion in the United States—what caused it, what conditions accelerated or controlled it, how it was influenced by different rainfall intensities, different slopes, different types of crops, different cultivation methods, and so on. Many observations had been made, but the subject had received little scientific study. In 1929, the Federal Government established a number of experiment stations to investigate soil erosion, and the work has expanded and continued up until the present time.*

*Since erosion is caused and influenced by so many different factors, and since the prevention of erosion requires consideration of such a variety of natural and human elements, soil conservation research covers a very broad field. It is the purpose of this article to enumerate the various types and projects of research carried on by the Soil Conservation Service today. Space will not permit more than a brief discussion of each item.*

It is important to mention at the outset that other agencies, both State and Federal, are conducting investigations on subjects having an important relationship with soil conservation research. All research of the Department of Agriculture and the various State agricultural experiment stations is coordinated by the Director of Research of the Federal Department, so that there is little if any overlapping of effort and there is free interchange of results and conclusions. Thus the Soil Conservation Service benefits from the soil chemistry, fertility, microbiology, and classification work of the Bureau of Plant Industry, the forestry research of the Forest Service, the findings of the State stations, and so on, and at the same time, the results of Soil Conservation Service studies are used to implement the investigations of other research agencies.

Broadly speaking, the objectives of soil conservation research are to provide methods for solving problems arising from erosion. Specifically, these objectives may be stated as follows:

(1) To determine the cause, extent, and effect of soil and water losses in the major agricultural regions of the country.

(2) To test and develop practical and economical methods for soil and water conservation upon agricultural lands where there is a notable erosion risk.

(3) To find the effect of land use practices upon runoff, soil losses, and flood flows.

(4) To obtain quantitative information on the damage to reservoirs, stream channels, and valley land from various types of erosion sediment and to study the laws governing this sediment.

(5) To study the climatic and physiographic factors affecting erosion in relation to land use at different periods of time and to determine the history of the effectiveness of various early methods of erosion control

(6) To find the influence of erosion control programs upon the farm income and farm living, as well as to determine the cost of large-scale erosion to farm and city communities.

(7) To develop and test new, profitable erosion control plants and trees, capable of bringing a superior economic return on steep, eroded, hilly farm land

(8) To study the hydrologic problems of irrigated agriculture and develop methods of draining water-logged, alkaline farm lands in the Western States

(9) To develop improved methods of draining farm land in the humid portions of the country, as well as to find the best type of cooperative organization to carry on this work.

## Methods Used for Soil Conservation Research

The following procedures are being employed to attain these objectives through eight closely integrated divisions of work

### Conservation Experiment Stations Division

The effects of a variety of crops, cropping practices, rotations, strip cropping, terraces, and methods of cultivation on quantitative losses of soil and water are being determined at some 19 soil and water conservation experiment stations upon controlled plots and watersheds. Studies are also being made in the field and laboratory, both at the above stations and at other critical locations, of the value of vegetative mulches, organic matter, and soil amendments upon the stability of soil aggregates, infiltration capacity, resistance of soils to wind erosion, and for moisture conservation.

### Hydrologic Division

The influence of land use and different types of vegetative cover upon runoff, erosion, stream flow, and flood flow is being studied on four large watersheds located in different representative problem areas. In addition, the effect of land use on runoff is being determined on 25 groups of small watersheds throughout the country. Laboratory studies are under way at three locations to improve outlet channels and hydraulic structures and to study the mechanics in the water erosion process.

### Sedimentation Division

The movement of erosion debris into reservoirs, stream channels and valley floors is being studied by detailed, field surveys. The mechanics of the movement of bed load and the fundamental laws governing the transportation and deposition of sediments are being investigated by hydraulic laboratory research.

### Climatic and Physiographic Division

Physiographic research is under way in critical erosion regions to find the relation between soils and underlying land forms and the occurrence of large scale gullying, soil creep, and mass movement, following climatic changes.

Large scale climatic studies, over important watersheds, are determining the manner in which storms build up, as well as the types of storms which cause serious erosion. Erosion history studies are tracing the nature, value, and extent of early erosion control practices.

### Conservation Economics Division

The effect of the soil conservation program upon farm income and farm living is being studied by analyzing farm budgets and farm accounts. These results are being compared with the experience of non-cooperating farmers.

Special studies are conducted also of the damage from widespread erosion to community water supplies and other public facilities.

### Hillculture Division

New and promising plants and methods of handling on an ecological basis for more profitable crops on eroded lands are being sought out, selected, and tested at four widely separated locations where plantings are made under a variety of conditions. Studies are being made, also to develop improved plants for trial and to find valuable by-products from them.

### Farm Irrigation Division

Farm irrigation research covers hydrologic problems of irrigating farm land in the eleven Western States and includes studies of water economy, evaporation, pumping for irrigation, water conveyance, spreading water for storage underground, the prediction of irrigation supply from surveys of snowfall, work on the design and improvement of irrigation apparatus, and summaries of irrigation laws.

### Farm Drainage Division

Field tests are made of the best depth of drainage on various soils for important crops, as well as the most effective depth and spacing of drains. Laboratory and field tests are under way of the resistance of drain tile to acid or alkaline soils and to frost. The performance of pumping plants is being tested, and the organization of drainage districts is being studied.

The experimental work of the foregoing eight divisions is all carried out in cooperation with the respective State agricultural experiment stations of the portions of the country in which the various projects are located. In addition, part of the investigations are cooperative with related subject matter bureaus of the Department of Agriculture.

## Results of Soil Conservation Research

### Conservation Experiment Stations Division

Quantitative measurements of soil and water losses from plots under controlled conditions, on a variety of soil types, have established comparative rates of losses under a diversity of cover ranging from bare ground to permanent sod.

Cotton plots cropped continuously, on moderately sloping land, at four Southern locations, lost from nineteen to thirty tons soil per acre each year. Growing the same crop in a four-year rotation reduced the loss by thirty to sixty-three percent, while planting to permanent grass permitted only traces of soil to wash away. With continuous corn, in the Middle West, soil losses were heavier than with cotton, and rotations were even more effective in reducing soil movement.

A finding of notable value for erosion control was the proof that thick grass or grass-legume mixtures hold soil in place so effectively that soil and water losses are no higher than under a good forest cover. It was also found that rotations which include two or more years of grass or grass-legume mixtures create a soil structure that resists erosion with the following cultivated crop.

Sub-surface cultivation, with the development of a stubble mulch which keeps crop residues on top of the ground, has proved to be a highly efficient method of soil and water conservation in the drier parts of the United States. The value of vegetative mulches and crop residues to promote infiltration of water into soils and prevent the formation of a puddled surface layer has been proven on a variety of soil types. Applications of organic matter or manure improve the permeability of soils to water and increase resistance to erosion by stabilizing the structure of the soil aggregates.

Other significant findings are:

(*a*) Heavy soil losses from cultivated fields left bare during the winter have shown the need for winter cover crops.

(*b*) The rapid increase of soil erosion with greater length or degree of slope has proven the need for protective measures on all sloping lands.

(*c*) Inexpensive bench terraces suitable for erosion control on steep slopes have been developed in Puerto Rico.

(*d*) Methods of contour planting, with a vegetative cover to replace cultivation, have reduced soil losses in Eastern orchards.

(*e*) Methods have been developed to reduce and reclaim sand dunes in the "Dust Bowl" area and to control wind erosion through vegetative covers, stubble mulches, and sub-surface cultivation.

(*f*) Detailed field studies of the infiltration of water into soils using both cylinders and artificial rainfall simulators on most of the more important soil groups of the country have shown that surface cover and soil structure are among the most important influences affecting water penetration.

(*g*) A series of instruments and improved farm machines have been developed for experimental erosion control studies and for farm use.

(*h*) The early work of the stations showed the effectiveness, as well as limitations, of many cultural and mechanical methods of erosion control such as subsoiling, contour tillage, strip cropping, and terracing, and so formed the basis of the first demonstration activities of the Service.

### Hydrologic Division

To supply the lack of quantitative, long time information upon the effect of improved land use and erosion control practices on runoff, stream flow, ground water and flood flows, three large representative watersheds of some 5,000 acres each have been selected and completely instrumented. One is the North Appalachian-Ohio river region, another is the Brazos river watershed, and the third is the Republican river basin. In addition, data on rainfall and runoff relations are being obtained from a 46,000-acre watershed under semi-desert conditions in New Mexico and from a series of 25 groups of typical small watersheds located throughout the country on demonstration projects.

The period of time since this work started in 1935 has not been sufficient for its full cumulative effect to accrue, but figures on rates and amounts of runoff from various types of vegetative cover have already been distributed to flood control survey parties and to operations technicians.

Hydraulic studies have also been made showing the value of various types of vegetative cover in outlet channels for farm use, and numerous improvements have been made in the design of hydraulic structures for erosion control.

Research in the mechanics of the erosion process has shown the exact size and type of impact from raindrops with various intensities of precipitation. This has resulted in the development of artificial rainfall applicators which show the efficiency of different natural covers in protecting soils against erosion.

### Sedimentation Division

A detailed compilation of essential data on the reservoirs of the United States has shown that over 10,000 have been constructed at a cost of some \$83,800,000,000. Sedimentation surveys of some 350 representative reservoirs in 36 States have proven that silting is reducing the storage capacity of 39 per cent. of them so rapidly that their effective use will be lost in 50 years. Another 25 per cent. will be useless in 50 to 100 years.

Field studies on watersheds adjacent to reservoirs have indicated that rates of silting could be decreased by at least 25 percent through soil conservation measures on agricultural land alone. With adequate stream bank and highway

erosion control additional reduction could be made. Hydraulic laboratory research has demonstrated that reservoir silting may be decreased also by utilizing density currents to by-pass silt-laden waters through outlets in the lower portion of the storage dam. The viscosity of the silt-laden stream due to concentration of suspended solids is an important factor that has heretofore been overlooked in reservoir research. Sedimentation research in the field and in the laboratory has demonstrated that on the Enoree river in the Piedmont of South Carolina the larger sediment above 0.35 mm. moves along the stream bed by rolling or sliding and is only in temporary suspension. This material remains largely in the channel after a flood. Sediment smaller than this critical size in the Piedmont constitutes over 90 per cent. of the erosion debris and moves almost entirely in suspension. This small sediment ordinarily passes out of the stream channel entirely during the course of flood flow.

Laboratory experiments have shown that the load of fine sediment in a stream tends to increase the velocity of flow. The characteristics of the turbulance produced by sediment in water were found to have a marked similarity to the characteristics of dust turbulence in the air and suggested that transportation of erosion debris by air and water follows somewhat the same fundamental laws.

Studies of valley sedimentation made in 40 areas of varying sizes in 18 States have proven that valley sedimentation damages due to accelerated erosion result largely from concentration of coarse sediment in the smaller valleys near the source of the sediment. Much of the injury to fertile land in these small valleys is caused by the filling of stream channels and subsequent overflow into agricultural areas.

### Climatic and Physiographic Division

An extensive series of maps has been constructed showing the drought hazard throughout the country, as well as the effective rainfall by various seasons and years. This material gives information on the risk in planting specific crops, such as wheat in the drier portions of the Plains areas, and will be of notable value to land use planning organizations.

New and improved frequency and probability tables have been constructed covering the seasonal and monthly drought and rainfall intensities which show the expectancy of notably high or deficient precipitation.

Large scale climatic studies carried out in Oklahoma and in the Appalachian area have shown the manner in which rain storms build up and develop so as to have an intense erosion risk. The data from these studies also indicate the reliability of rainfall measurements obtained by a close or wide spacing of the individual rain gauges.

A new technique has been developed for measuring evaporation from land surfaces to determine the water loss occurring during various cropping seasons. This is done by measuring the vertical distribution of moisture in the lower part of the turbulent layer of the air and determining the intensity of mixing which occurs. A new instrument has been developed for applying this technique for use in flood control studies.

Climatic studies have revised the conception of the hydrologic cycle based on new work by methods of air mass analysis.

Climatic studies in the Southwest where notable gully trenching has occurred have shown that human influences through grazing and disturbance of the vegetative cover have probably been the contributing factors in producing gully cutting and erosion. No conclusive evidence was seen of wide scale climatic changes in this region.

Physiographic studies of gully erosion have show the importance of surface soil and subsoil relations and have demonstrated the reasons for the occurrence of catastrophic gullying in regions such as the Piedmont.

Investigations of mass movement in the eastern United States have shown the importance of this process when soils become saturated and move in large masses by slumping, frequently causing breaks and the beginning of gullying.

Physiographic investigations in the Piedmont region have shown that lateral movement of soil material has been a significant factor in determining soil characteristics and the distribution of soil types. Tremendous thickening of the soil mantle above organic deposits has occurred in old buried valleys, and local relief has been greatly diminished by lateral movement of soil material. Great variations in the depth of compact horizons resistant to gully erosion have resulted, and the relation of these variations to present surface forms have been explained. Efforts should be made, in planning for erosion control, to restrict concentration of storm runoff to those areas having a thick mantle of compact soil.

Studies of the history of soil erosion in several portions of the Southeastern States prior to the Civil War have shown that the danger from erosion was recognized at an early period, and individual farmers at times had considerable success in developing control methods. United action, however, was lacking, and the results demonstrate the limitations that develop where community programs depend on the initiative of a few individuals. Similar studies of erosion history in Oklahoma showed the acute problems which arise when a large area of land with diverse soils, climate, and cropping adaptations is brought under cultivation at one time.

### Conservation Economics Division

Farm business studies made under a wide variety of conditions have established that properly developed conservation plans need not reduce farmers' incomes, but instead can actually contribute to improvement, especially when contrasted with the income to be expected from farm operation under soil-depleting methods.

The heavy financial loss to the public from the silting of reservoirs and injury to highways has been determined, and the reduction of damage by installing conservation measures on adjoining land has been demonstrated.

The detailed studies of adjustments and changes in the farm business made on demonstration project areas as a result of a conservation program have furnished material for widespread use by farm planners in the new conservation districts work.

Field studies have been made of the economic return from the adoption of specific conservation practices and have included determinations that the power consumption in contour plowing was less than the usual up and down hill system of farming. The costs and benefits of various types of terrace construction by different methods of operation has been also analyzed, and detailed studies have been carried out on other similar improved procedures.

The benefits from erosion control with specific important crops have been evaluated in terms of improved yields, and these results have been contrasted to the crop reduction taking place with continuous soil loss. The economic returns from pasture improvement programs have been studied, and the contribution that such work makes to improve farm living has been determined in a number of important dairying regions.

### Hillculture Division

An integrated system of farming suited to steep hill land and based on ecological principles has been developed and adapted to the use of tree, timber, nut and fruit trees, and erosion control ground covers In this work over 300 species of promising economic plants and trees are under trial and test

The value of improved strains of black locust such as the shipmast has been proven, and it has been found they possess greater durability of wood, improved stem form of the tree, and more rapid growth. The other superior strains have been located and are now being tested under a variety of conditions. In order to propagate shipmast locust and other desirable trees more rapidly, improved methods of vegetative reproduction have been developed in cooperation with the Bureau of Plant Industry. These have been adapted to such trees as black locust, pecan, honey locust, holly, and black walnut. This work has included more expert use of older methods of propagation and the development of improved technique suited to individual species of trees or plants. A large number of growth promoting substances have been tested for use in rooting hard wood cuttings.

A number of plants have been selected and developed to produce fruit crops on unproductive eroded areas. Among these are the beach plum for sand dune land and the rabbit-eyed blueberry which is adapted to many eroded soils in the Southeast. Improved fruiting strains of holly have also been selected and developed for use in the Christmas green market.

### Farm Drainage Division

The limitations and capacity of open drainage ditches have been investigated for important farming areas in Iowa, Tennessee, and Mississippi. This work has served to show the possibility of this system of drainage contrasted to the usual tile drainage systems.

The efficiency of operation of some 304 drainage districts in Mississippi has been determined. This investigation has covered the determination of the optimum spacing of drains, the size of tile used, and the method of organization

of the drainage districts. Recommendations have been made for improvement in the operation of the districts and for greater efficiency in drainage work.

The factors affecting the durability of concrete drain tiles in an acid peat or in alkaline sulphate soils have been studied, and formulas have been recommended for the construction of a better drain tile which will be more resistant to soil corrosion. This work has been based on a series of tests extending over ten years.

The optimum depth of drainage of peat and muck soils in the Everglades of Florida has been studied, and it was found that the most satisfactory water level reduced oxidization of the peat, increased crop production, decreased fire hazard and lengthened the useful life of the soil.

Drainage studies in Louisiana on sugar cane lands showed the effective depth of drainage for tile or open drains and also indicated the necessary financial limitations of this type of improvement.

FARM IRRIGATION DIVISION

A series of quantitative determinations have been carried out in all the major problem areas of the Western States in which the quantities of irrigation water used have been determined under a variety of farm practices and conditions. Consideration has been given to the kind and value of crop, the local precipitation, and range of temperature The application of these studies has enabled the practice of greater economy in the use of water and has made possible an appreciable expansion in the irrigated acreage in many of the Western communities.

The increase in acreage irrigated in many portions of the West by pumping from ground water supplies has resulted in many places in a material lowering of the average ground water level. A series of studies carried out in southern California have shown the possibility of increasing sub-surface storage by applying freshet flows to gravelly fans located in canyon mouths and on other suitable tracts adjacent to the main ground water beds. This work has resulted in material improvement in ground water conditions in practically all of the regions where it has been employed.

Research on the flow of water in irrigation conduits has shown that these ditches and pipes may be designed for maximum capacity with a minimum cost of materials. It has also been demonstrated that the deteriorating effects of age and obstructing influence of vegetation and algae may be prevented with proper lining of ditches and with a selection of suitable material for the construction of conduits. This work has materially increased the efficiency of water distribution in many of the irrigated areas.

It was found many years ago that evaporation from reservoirs reduced the supplies available for applications to crops. Quantitative studies carried out by this Service in the principal regions of the West have shown the amount which must be allowed for this loss in figuring the probable supply which will be available for irrigators. These studies have enabled more adequate distribution of available water for all the principal crops that depend on reservoir storage for their water supply.

A series of studies carried out upon the measurement of irrigation water have developed a number of improved instruments for accurate measurement. Among these are the Parshall measuring flume. Improvements have also been made in various minor devices such as current meters and weir installations.

A series of investigations upon the movement of irrigation water through the soil checked by soil moisture determinations have shown the rate and quantity of water by capillarity and the influence of distance of spacing of irrigation ditches upon horizontal movement in the soil. This work has made it possible to achieve greater efficiency and economy in time of application and method of distribution of irrigation water to deciduous and citrus orchards.

Extensive studies have been carried out upon irrigation law and customs affecting the distribution of water in all the Western States. This work has resulted in the improvement of possible regulation of water supplies and has had an important place in determining legislative action in the Western communities.

EVALUATION STUDIES AND FIELD TESTS.

Cooperative evaluation studies and field tests have been carried out by the research divisions and the technical operations divisions of the Service and the interested State agricultural experiment stations. These studies have aided in determining the effectiveness of the research recommendations when they were applied to farm lands under a wide variety of conditions

The mulching of orchards both on a field scale and in contour strips has proved notably valuable for moisture conservation and erosion control, where continuous vegetation proved to make too heavy a draft upon soil moisture The straw mulch was especially effective in increasing the rate and amount of infiltration of water into the soil and largely controlled runoff and soil loss.

Studies to evaluate the success of strip cropping emphasize the need for maximum adherence to the contour and leaving broad and well grassed waterways to take care of runoff. Improved rotations supplemented by lime and fertilizer when required contribute to the effectiveness of strip cropping. On long slopes, terraces were found to be a necessary supplement to strip cropping and were especially valuable on the upper parts of the slopes.

Contour furrowing of pasture and range lands in the Southern Great Plains was found to increase water penetration and result in denser vegetative cover and increased yield of pasture.

Notable increases in yields on farm fields on which conservation practices had been installed on bean land in New Mexico were reported. In a fouryear period it was found that the terraced and contoured fields yielded an average of 244 pounds per acre, contrasted to 182 pounds for the unterraced up and downhill plowed lands. This represented an average increase of 44.8 percent for the four years.

Similar results were secured in a study of wheat yields for a shorter period in the Southern Great Plains where a large number of terraced fields were contrasted to similar unterraced and non-contoured areas. The acre yields of the terraced and contoured fields were 16 1/4 bushels per acre as compared

to 11 9 bushels for the unterraced, uncontoured areas, thus showing a gain of 39 per cent. in yield for the fields with improved conservation practices.

In a series of studies in the Palouse section of the Pacific Northwest, it was found that 75 percent of the crop land produced 85 percent of the total wheat yield with a cost of production that only amounted to 65 percent of the usual figure. Studies of land use resulting from this work showed that it was more economical to seed the eroded hill tops and steep slopes to alfalfa and grass and retire them from cultivation, concentrating the major crop of the area upon the productive low cost lands.

A series of studies conducted in Indiana, Ohio, Missouri, and Iowa have shown that corn yields are directly related to the depth of surface soil remaining upon the land. In one study where erosion had progressed to a notable extent and only 1 ½ inches of surface soil remained, the corn yields had dropped to 37 ½ bushels per acre. Contrasted to this, where 12 inches and more of surface soil remained the yields were 75 bushels per acre.

## EXTENT OF PRESENT KNOWLEDGE ON THE ARTIFICIAL INSEMINATION OF DOMESTIC ANIMALS

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*In recent years, the problem of the artificial insemination of domestic animals has come to the fore in nearly every country of the world and, in some, its practical application has given valuable results. When the present international conflict will have ended, artificial insemination will assist towards the building up of the decimated livestock of many countries and covering the shortage of breeding males and fully utilizing their high value.*

I. MOSKOVITS in March, 1934 published for the first time in the *Monthly Bulletin of Agricultural Science and Practice* of the International Institute of Agriculture a general review of all the studies which had been made up to that date on the artificial insemination of domestic animals.

This concise review, both deductive and detailed, by contributing to the divulgation of the problem of artificial insemination caused considerable interest among scientists and stock-breeders.

After the masterly experiments of LAZZARO SPALLANZANI at Pavia in 1779, and of PIETRO ROSSI at Pisa in 1782, for over a century very few other workers studied the question. Towards the end of the last century, the Russian ELIA IVANOV from his experiments supplied the theoretic-economic bases of artificial insemination, by establishing, at the same time as the German HOFFMAN, a method which remained classic for many years. In the U. S. S. R., artificial insemination made great strides from the first years of the Revolution owing to the urgent necessity of increasing the livestock which had fallen con-

siderably. According to official statistics, published on occasion of the Agricultural Exhibition held at Moscow in 1939, over 50 million female animals (ewes in particular) were inseminated artificially. In 1939, 1,200,000 cows and 120,000 mares are said to have been subjected to this process. The Russian scientific contribution was no less remarkable. After the diffusion of Russian methods and their success, technicians throughout the world turned their attention to the study of the problem with a view to improving the scientific basic principles and method of operation.

Artificial insemination, however, could not become practically applicable until the collection of the sperm —basic technological phase and very difficult— was made possible by means of the artificial vagina. The physiologist GIUSEPPE AMANTEA of Rome was the first to devise a model of this apparatus about 1914 during the course of his studies on sperm production and collection of semen by 'fictitious coitus'. Subsequently experimenters in other countries constructed types based on the same principle for different animals.

## I. — Technique of sperm, its dilution and preservation

This is the most important part of the subject, but in which there are many gaps to be filled and obscure points to be cleared up. The problem of the survival of the spermatozoa outside the living organism should be considered as essential in artificial insemination, as it comprises the 'abstraction' of the spermatozoa from the male genital organs and their 'inoculation' into the female genital organs, after a more or less long period of contact with and sejourn in the external environment. The preservation *in vitro* of the fertilizing capacity as also the kinetic capacity of the spermatozoa during a period always more prolonged, represents after all an essential technico-economic factor of the system. Sperm motility, especially in progressive and energetic countercurrent (positive rheotaxis), is undoubtedly a sign of vitality, but is not sufficient to prove that the fertilizing capacity has been conserved (YAMANE, LAMBERT, HAMMOND, VAN DER PLANK, etc.), that is to say, that the spermatozoa may reach and penetrate the ovule, determining thus the segmental process and development, up to the birth of a normal individual also capable of growing to the adult stage and breeding normally (BONNADONNA). The investigations of different workers, especially of REDENZ, LANZ, MOORE, BENOIT, BERLINER, YOUNG and the Russians in general, have pointed out the importance of the epididymis in animals of internal fecundation, as organ of maturation and repository of the sperm cells (tail of the epididymis, beginning of the vas deferens). According to REDENZ in particular, the spermatozoa, in passing through the epididymis, acquire a special power of resistance at the same time as protective properties of a morphological order, particularly, *inter alia*, what has been agreed to call the 'capsule' or 'lipoid sheath' (POPA and MARZA, MILOVANOV), which would also stimulate their propulsive capacity. In the epididymis the spermatozoa are immobile, in a medium of pH =~7. MCKENZIE, PHILLIPS, ANDREWS, FUKUI, HELLER, MOORE, SIMEONE and YOUNG, etc., in demonstrating the important thermoregulator function of the

scrotum, agree that the organic temperature of the organs it contains is physiologically lower than that of the animal organism in general. The contribution of the secretions of the accessory or secondary sexual glands, at the time of ejaculation, changes the reaction of the medium alkalizing it (pH = 7 and +), raises the electrolytic rate, especially Cl-ionic, and the spermatozoa then arrive at their maximum kinetic power, but losing rapidly their vitality and the ' lipoid capsule ' would in that case be destroyed.

The problem of the ' lipoid capsule ' as regards its existence and histological meaning is not as yet very clear, as up to the present no definite conclusive proof has been obtained. Recent investigations (BONADONNA and FUMAGALLI) have proved that in the spermatozoa of the bull, contrary to general belief, the stabilization of the material of the head does not take place in the testicle, but in the genital ducts, after all connexion with the Sertoli cell has ceased. These changes by which the head, from basophilic that it is, becomes acidophilic (and consequently from gramnegative becomes grampositive) take place slowly. It does not seem, on the other hand, that there is any part of the genital ducts where these changes are effected and therefore, it is in the ampullae that all the spermatozoa would achieve their complete development.

The present day technique of p r e s e r v a t i o n  o f  t h e  s p e r m is based on the collection, in the most rational manner, of the sperm itself, avoiding any contamination or disturbance of the osmotic and electric equilibrium as well as temperature shocks (possibly in a closed place and at a temperature of 18-20° C); the partial or total elimination of the secretions of the secondary sexual glands (WALTON, MCKENZIE, LASLEY, PHILLIPS), when these are abundant (stallion, boar) replacing them by suitable diluents (tartrates and sulphates); the addition in certain proportions (1 : 1, 1 : 4) of spermo-physiological diluents containing buffer solutions to assure within the limits possible, the acid-basic equilibrium (phosphate, glycocoll, asparagin, gelatine) and the optimum electric state, as well as other substances considered advantageous (glucose, egg-yolk, peptone, blood serum, etc.); reduction to the minimum of the kinetic activity of the spermatozoa in order to avoid dispersion of energy *in vitro* (glycolysis) and intoxication through the accumulation of catabolic substances (gelatinization, cooling from + 5 to 0° C.).

In 1938, the German investigator JAHNEL in special experiments found that the human sperm subjected to intense cold recovered motility after 4 hours at–196°C. and after 40 days at–79°C. KAJIYAMA stated that rabbit spermatozoa resisted temperatures at –15 and–70°C.

As regards d i l u e n t s , use has been made of the common physiological solutions (of RINGER, LOCKE, TYRODE, etc.) and also merely the normal NaCl physiological solution (KÜST, BERLINER, COWART, MEANS and WRIGHT) with varying results (PIROCCHI, HATZIOLOS, YAMANE, SCHÜLER, etc.). These solutions stimulate the motive force of the spermatozoa, probably owing to the presence of electrolytes, but in the long run are harmful to the seminal cells.

Russian experimenters have tried out different gluco-saline diluents, subsequently used practically everywhere and with varying results, More recent-

ly, they have proposed (MILOVANOV, NAGORNY, SINVOKON, MALAKOV, RAZUMOV, LUKIN, EREMEEV, etc.) the gelatinization of the sperm, also successfully experimented elsewhere (SÖRENSEN, OLBRYCHT, etc.). In 1938, PAUL PHILLIPS for the dilution of semen employed a mixture of fresh egg-yolk (hen) and a phosphate buffer (one volume of fresh raw egg-yolk with one volume of an M/15 phosphatic buffer solution of $KH_2PO_4$ and $Na_2HPO_4$ with a final pH of about 6.72), obtaining encouraging results, in agreement with other American workers (DAVIS, PERRY and BARTLETT, McKENZIE, PHILLIPS and LARDY, WILLETT, FULLER, SALISBURY, etc.); the American SALISBURY holds that the addition of sodium citrate corrects certain disadvantages of the diluter.

The Italian Experiment Institute " Lazzaro Spallanzani " for the artificial insemination of animals at Milan has carried out experiments on approximately 200 diluters. Interesting results were obtained (kinetic resistance *in vitro* and fertilizing time while *in vivo*) by employing the basic solution indicated by PHILLIPS (fresh raw egg-yolk, M/12 and M/15 buffer solution) with or without the addition of gelatine (5-10 per cent.) as also asparagin (2-5 per cent.) and testo-hormonized blood, obtained from the living animal by means of a special process. Normal pregnancies were obtained by inseminating semen after 171 hours, 114 hrs. and 50', 100 hrs. and 20', 92 hrs. and 35', 91 hrs. and 45', 76 hrs. and 20', etc. and several times with semen preserved 24-50 hours. It was found that with these a high rate of fertility was obtained especially if the semen employed was fresh and only preserved for 24-48 hours, limit moreover which should not be exceeded, unless in exceptional cases, in the storage of bull and ram sperm. Experiments carried out by other workers demonstrated the possibility of conserving artificially ram and bull spermatozoa over a prolonged period; however, HAMMOND, WALTON and KÜST had already affirmed that delay after the collection of sperm injures the fertilizing capacity of the spermatozoa and rapidly lowers the fertility percentage although the spermatozoa remain very mobile. On the other hand, there are the excellent results obtained by WALTON and PRAWOCHENSKY, who transported sperm from Cambridge to Warsaw (a distance of 2,400 km. and conservation of 5 hours), by WALTON, EDWARDS and SIEBENGA in 1937, with bull sperm, sent from England to Holland and kept from 1 to 3 days; by MILLER and GARCIA MATA in 1936, when they transported bull sperm from Washington to Buenos Aires over a course of 13,500 km. and length of storage of days; by SWANSON at Knox (Indiana) who, on 6/10/40, obtained a calf, from a cow artificially inseminated with semen kept for about 8 days and obtained from a bull belonging to the University of Missouri, Colorado, about 400 km. away; by PHILLIPS, SCHOTT, GILDOW, TERRIL, who, at Dubois (Idaho), obtained impregnation of ewes with sperm transported over a distance of 700 and 2,600 miles; by WINTER who at Minnesota obtained positive results with ram sperm kept over 5 days; by DAVIS and WILLIAMS in Nebraska with bull sperm after 99 hours; by YAMANE and others in Japan, by JORDÃO in Brazil, by HOWARD CLAPP in Wisconsin; by SCHWAB in Switzerland, by HENDERSON in New Jersey, by SÖRENSEN in Denmark, by BAICOIANU and others in Rumania, etc., employing bull and ram sperm kept for many hours and obtained from distant areas. In 1938, bull and ram semen

was transported by plane from Milan to Addis Ababa, a distance of approximately 3,600 km. covered in about 100 hours.

The problem of the preservation and transport of sperm is still in the experimental stage, the opinions of different investigators are often contradictory in regard to the methods to be employed. On the one hand, the preservation of the sperm in the pure state is considered better, on the other, preference is given to preliminary dilution by means of suitable diluents (we have already shown that gelatined diluters containing egg-yolk appear to give satisfactory results) and also preliminary centrifugation to eliminate the secretions of the secondary sexual glands when they are abundant as in the stallion and boar (WALTON, ABBONDANZA, RIMOLDI, MILOVANOV, MCKENZIE, LASLEY and PHILLIPS, GUERREIRO, etc ) It is also affirmed that both the cooling and successive warming of the sperm to room temperature should be done in stages (PRAWOCHENSKY, MILLER, OLBRYCHT, MCKENZIE, WINTERS, COMSTOCK, COLE, GREEN, BULIK, PHILLIPS, BURCH, GLADCINOVA, ANDREW, etc.) The experiments of TABORDA, DAVIS and WILLIAMS, as well as our own studies, on the other hand, only gave the same results provided that the test tube containing the seminal fluid was wrapped in cotton wool (preferably unbleached cotton), the whole enclosed in a small waterproof bag and placed in a thermos flask, packed with ice. The method of preserving sperm in a thermos is the most suitable and the aeroplane the best means of transport. The Japanese (YAMANE) and the Russian (SEREBROWSKY, etc ) carried out experiments on the transport of sperm by carrier-pigeons and the Russians are said to have organized a system for supplying quantities of semen by dropping at any required place special thermos flasks attached to small parachutes

## II. Procedures involved in artificial insemination

The methodology necessarily draws elements of improvement from the knowledge available on the anatomy and physiology of copulation and, therefore, erection, coitus and ejaculation. On the other hand, the application of artificial insemination contributes to a fuller knowledge of these phenomena

Everything known on the neuro-physico-hormonic mechanism of sexual stimulation and determinism has been utilized for the collection of sperm by means of what is called 'fictitious coitus' (paraphysiological methods). The use of a 'dummy' represents the most original aspect of the modern technique of artificial insemination. The outbreak of precoital and coital manifestations seems to be able to relate to the tactile and visual peripheral stimulations, which the male animal when it is sensitive (depending on the race, breed and individual) receives as a result of the immobility and absence of defensive reactions, that is to say, conditions of apparent *acceptance*, account taken of the limited capacities of appraising details, owing to congenital hypermetropia.

Smell would serve chiefly to attract from a distance, while the thermic factor seems to act on the nerve terminations of the penis to bring about discharge of the ejaculate (according to MCKENZIE not indispensable with the boar). A certain degree of sensitive and motive obtusion, individual, of breed and race

as well as technical preparation and experience are of decisive importance. Draught stallions, for example, submit better than thoroughbreds. Cattle and hogs, in any case respond better than other races and in sheep, the Karakul breed, of lively character and libido, are more suitable for the purpose than other breeds, etc.

According to the opinion of some workers, the continual use of the dummy with bulls would, in the long run, provoke a diminuition in libido or sexual desire with the production of inferior quality sperm (ALTARA, PELI, etc.). In In this respect also, individuality plays a very important part. We are of the opinion that an erroneous technique adopted in collecting the sperm would reduce libido in the bull. Keeping the males and females always separate would have a similar effect, promoting onanism to the detriment of spermiogenesis.

A whole ensemble of elements important for the aims followed relate to the sector of the female genital organs, which receive physiologically the ejaculate. as well as to the modalities of progression of the spermatozoa to reach the ovule to be fertilized.

Russian workers classify animals into three types: vaginal type (ruminants in general and rabbits), uterine type (Equidae, sheep and dogs) and duct type (birds).

With animals of the vaginal type, coitus is immediate, the female is in heat only for a short period, the ejaculate is small in volume owing to the absence of secondary fluids (2-7 cc. in the bull, 0.5-1.5 cc , in the ram) but has a high spermatozoon content (500,000-2,500,000 in the bull, 30,000-4,000,000 in the ram). In the females of ruminants there is also the cervical duct to which is attributed the triple function of filtering, strengthening and storing the spermatozoa. The sperm of these animal species is preserved more easily and the rate of fertility, by artificial insemination, is relatively higher, even employing comparatively small quantities of the seminal fluid (0.25-1.00 cc. sperm, pure or diluted). We consider it prudent to effect inoculation of the sperm in the cranial portion of the cervical duct, thus avoiding contact with the vagina and the cervix, in general less favourable for the survival of the spermatozoa (BONADONNA, HENDERSON, PERRY, etc.). The brevity of the oestrual period and the role of repository of the cervical duct (QUINLAN, MARÉ, ROUX, PHILLIPS, ANDREWS, etc.) would have the effect of facilitating the fertilizing contact between the spermatozoa and the ovum. Introduction of the sperm into the uterus is not indicated in these animals, as it causes expulsive movements and metritis (BONADONNA).

In animals of the uterine type the seminal volume ejaculated is considerable (80-300 cc. in stallions and even 150-1,500 cc. in boars) because of the very large quantity of secondary spermatic fluid with the consequence that the limits of survival of the spermatozoa are fairly low. The number of sperm is reduced (200,000-400,000 in the stallion, 100,000 to 300,000 in the boar). The duration of copulation is long and ejaculation takes place in three phases, of which the second is the most important and comprises the emission of the sperm mass. The duration of the oestrus in the females is also long (2-3 days in the sow, 3-7-15

days in the mare). By means of instrumental insemination the sperm is introduced directly into the uterus. Special technical improvements (fractionated collection of the sperm, preliminary centrifugation, dilution by means of suitable diluters, deep inoculation) have enabled different workers (WALTON, SALZMAN, WINTERS, COMSTOCK, COLE, GREEN, BULIK, YAMANE, KATO, ABBONDANZA, GUERREIRO, McKENZIE, PHILLPS, LASLEY) to economize the quantity of ejaculate (by injecting respectively 10-20 cc. into the mare and 30-7 occ. into the sow); this increases or at least does not reduce the percentage of successful results obtained and eliminates, consequently, the physiological sterility frequent in mares, due to the want of coincidence between the sperm injection and follicular dehiscence (DAY, HAMMOND, MELCHIORRI, BONADONNA). In fact, the length of rut-time, the uncertainty of time of follicular dehiscence and the limited life of the spermatozoa (8-9 hours) lowers, in horses, the probabilities of success, if the development of the follicle is not attentively followed by way of the rectum. The majority of investigators (SCAMBON, CHAMPY, GÖTZE, MILAVANOV, HAMMOND, DAY, etc.) tend to believe that ovulation takes place near the end of heat and even after heat ends. Some workers (HAMMOND, KRANT, MIRSKAYA, CAFFI, ZIVOTKOV and MOSSOLOV, etc.) advise repeating insemination during the same oestral period. Our experiments have confirmed the indications of GÖTZE, DAY, BERTHELON, SCAMBON, and CHAMPY, etc. on the possibility of increasing positive results by coinciding the sperm injection into the mare with the dehiscence of the ovum, which is relatively easy to realize by watching the development of the latter.

Repetition of insemination during the same heat period is also advocated by some investigators for cattle (KIRILLOV, ANDREEV, etc.) and sheep (MILOVANOV, PEREGON, LIPOV and STOYANOVSKAYA etc ) and, in this case to increase twin births.

It appears that the dehiscence of the follicle of the ovary also takes place in other animal races towards the end of heat or immediately afterwards; it is always wise, therefore, to effect artificial insemination of cows (McKENZIE, PARSUTIN, CASIDA, NALBANDOV and WISNICKY, HAMMOND, KUST, WERNER, CASIDA and RUPEL), as well as ewes (KARDIMOVIC, MARSAKOVA, GIACOMINI, ZAJAC, HAMMOND and MARSHALL, etc.) and sows (RODIN, MILOVANOV, etc.) towards the second half of the heat period. Artificial insemination after heat has ended, although successful results have been obtained in a few rare cases (PEARL), is, in general, to be avoided.

## III. — Procedure involved in the collection of sperm and insemination

All operations regarding artificial insemination, in particular, the collection of the sperm, should preferably be carried out in a closed locality, suitable from a hygienic and technical viewpoint and heated in winter.

The artificial vagina usually gives good results with cattle, sheep, pigs and rabbits. The types constructed for these different species and in different countries only differ slightly. The artificial vagina for Equidae constructed in Italy (in metal and rubber) seems to give better results than other

types. Original innovations were recently made in the United States by McKenzie in the artificial vagina for boars and by Berliner and McKenzie in the model for stallions. The artificial vagina designed by Neves e Castro foi the stallion is useful for the study of spermiogenesis. Salisbury and Willett devised a constant temperature artificial vagina for cattle and McKenzie another for the fractionated collection of equine sperm. As regards cattle, the Americans Miller and Evans, basing their work on the information reported by Case in 1925, proposed what is called the massage method consisting in massage of the seminal vesicles and the seminiferous ampullae by way of the rectum. Rimoldi has recently improved this technique. The American method, however, everything considered, is inferior to that of the artificial vagina (semen is more fluid; not all animals lend themselves to this system; considerable skill on the part of the operator is necessary; after a time, injuries are caused to the male genital organs, etc ) This system may be useful when the bull is unable to mate normally (advanced age, defects of feet or penis)

Both for sheep and goats and in general for small ruminants (deei, gazelles, fallow-deer, antelopes, etc.), an advantageous system of collection, under many aspects, is that of electro-ejaculation which is based on the electrical stimulation of the 2nd and 3rd pair of lombar nerves with passive emission of the sperm and penis flaccid. Developed by the Australian Gunn, who knew the experiments of Battelli, the method was improved by Olbrycht and in Italy, by modifying the metallic double cylinder dorsal electrode, and today is applied by many workers (Quinlan, Maré, Roux, Claasens, Falcoianu, McKenzie, etc.). The Italian electro-generator has also given successful results in Africa and other countries.

In birds, collection of the sperm by the American system of Burrows and Quinn, by squeezing of the seminiferous bulbs after preliminary massage of the abdomen, is rapid and easy. Griffini and Rimoldi, have applied it to Gallinaceae, palmipeds and birds, independent of size and anatomical structure of the copulatory organs. With the apparatus of sperm collection invented by the Japanese Isikawa, it is possible to remove the sperm in the pure state and particularly suitable for preservation; however it takes the cock some time to get used to this system. For palmipeds, the Russians have constructed special instruments comparable to the artificial vagina.

Up to date we have not obtained any result with the electro-ejaculation method advocated by other workers (Letard and Tinet) also for birds. Tinet applied this method successfully to mice and Shibata, Murata, Yobunaka, Hiraboyashi, to rabbits. For rabbits, the Russian (Fraioli) and English (Macirone-Walton) artificial vagina was equally successful. With dogs, sperm was obtained both by using the artificial vagina (Amantea, Freiberg, etc.) or by masturbation (Spallanzani, Hermansson, Griffini and Rimoldi).

The majority of technicians employ, for inoculation of the sperm into the female genital organs, all-glass syringes (sometimes with an ebonite catheter) of more or less complex form and construction, with or without lighting apparatus, regulators, etc. The high cost of the more complicated models

on the one hand, and the hygienic danger of the use of the same syringe for several females, on the other, has led different investigators to try further innovations.

TASSINARI and COLE have constructed ingenious types of syphon and ampoule syringe with a capillary nozzle, but which are relatively not very convenient for practical use HOFMANN, ALTARA, ESCHINI and others suggested the use of syringes with interchangeable catheters. We have recently adopted, both for cows and ewes, syringes entirely of glass, holding 2 cc, with a catheter of welded glass, 15-16 cm. long, and provided with a metal regulator for measuring the sperm. The modest cost of the instrument allows the operator to keep several, thus using a separate one for each female to be artificially inseminated.

The studies of Russian workers, of SORENSEN, etc. on gelatinized sperm, have led to an profound revision of the technique and consequently of the instruments for the inoculation properly so called.

The use of soluble capsules, filled with gelatinized sperm (we have also used sperm in the pure state or diluted with liquid diluants) and introduced into the genital organs of the female seemed not long ago to give excellent results In cattle, the method was found advantageous, using ordinary capsules of glucose or dextrin. RAZUMOV used capsules of paper and EREMEEV cocoabutter capsules. They are the same capsules as employed in medicine for medicaments of unpleasant taste We have obtained good results with 0.5 cc capsules (0 25 cc. of pure sperm diluted with an equal volume) when introduced into the second half of the cervical duct The capsule introducer and holder, constructed for the purpose, have, in general, given good results. For horses, the capsule system is less practical, owing to the tendency of the capsules to get out of shape during drying and filling, because of their larger size (10 cc.). In the United States, for some years use has been made of special capsules (new double-walled capsules) supplied by the Kansas City Impregnator Company for the artificial insemination of horses Their use is also recommended by MCKENZIE.

The ingenious experiments of SÖRENSEN, however, led to the substitution of the capsules by small cellophane tubes and subsequently to the construction of a suitable instrument for the introduction of the contents of the tubes into the female reproductive organs. For cattle, SÖRENSEN has adopted a metallic piston instrument for small cellophane tubes 7 cm. long to be filled with gelatinized sperm only. According to a communication of SÖRENSEN, about 400 of these instruments have been distributed to Danish veterinary surgeons.

We have made some slight modifications in the SÖRENSEN instrument, by shortening it and also attempting to adapt it to ewes. We have found moreover, that when the sperm is of good quality and recently collected, cellophane tubes 3.5 cm. long, that is containing 0.10 cc. pure sperm, are sufficient. With the same process, we have also been able to inoculate sperm in the pure state, or else diluted with non-gelatinized diluters.

GUERREIRO, at the Milan Institute, has applied the same system in artificial insemination of mares, replacing however, the cellophane by glass tubes holding 10 cc.

*Fecundity in relation to system of inoculation.*

| | Method of inoculation | | |
|---|---|---|---|
| | Syringe | Cellophane tube | Capsule |
| Number of animals artificially inseminated . . | 20 | 20 | 12 |
| Number of animals settled . . . . . . . . . | 13 | 14 | 9 |
| Percentage of animals settled . . . . . . . . . | 60% | 70% | 75% |

## IV. — Examination and estimation of sperm prodnction

Artificial insemination and the diffusion of its application has brought these two problems to the fore, thus contributing towards creating suitable methods and obtaining the solution, which, however, is far from having been attained.

The characteristics of sperm production may vary for a multitude of reasons: health condition, disease, climacteric stage, nutrition, hygienic conditions in care of animal, season, sexual conduct, age, breed, etc. Individuality is the predominant factor as regards quality and continuity of sexual production. As a rule, the more primitive breeds and animals raised under less artificial conditions give a better and more copious sperm.

Numerous workers (LAGERLÖF, DONHAM, SIMMS, WILLIAMS, SAVAGE, SCIUCHETTI, FEILING, RÖMMELE, WALTON, LAMBERT, YAMANE, HAMMOND, etc.) have studied the problem of s p e r m a t i c m o r p h o l o g y. Regarding the characteristic properties of individuality, GÖTZE recently carried out a series of interesting experiments explaining to a large extent the more typical cases of male physiological sterility, partial or total, transitory or definitive, etc. The necessity, therefore, of establishing for each male breeding animal the t y p e of its spermatic production is seen.

No less interesting are the quanti-qualitative and morphological disorders caused by p a t h o g e n i c f a c t o r s in the male reproductive organs, and in particular those of the testicles. LAGERLÖF, SCIUCHETTI, WILLIAMS and SAVAGE, SANDERS and NIELSEN, FEILING, BAREGGI, etc, have studied the question with special reference to cattle. The most reputed investigators agree that the fertility of the sperm is in relation to the percentage of abnormal spermatic forms (LAGERLÖF, FEILING, BROMAN, POYARKOV, CARY and LESPINASSE, MOTT and MATSUOTA, WILLIAMS, MÖNCH, SAVAGE, BERLINER, VOLOSKOV, etc.).

Two questions still remain open; these regard both the genetic evaluation of the reproductive capacity of the male and the evaluation of the sperm for artificial insemination: How can the fertilizing capacity of the sperm be evaluated; how can the absence of pathogenic elements be recognized?

To solve the first, especially in the case of preserved sperm, would signify the surmounting of the greatest obstacle in the technology of artificial insemi-

nation. Some workers and among these, MILOVANOV, LASAGNI, CICOGNA, etc. carried out studies on the longevity or degree of vitality of spermatozoa. Other workers (WALTON) suggested the evaluation of the resistance and degree of vitality of spermatozoa under the influence of external agents. The most rational and modern test, however, seems to be that of WALTON and EDWARDS, that is, the estimation of the respiratory coefficient of sperm by means of the BARCROFT-DIXON respirometer. The experimental demonstration made by these two workers appeared complete, but it is a difficult method to apply and necessitates great skill on the part of the operator. The Dutch PLANK and SIEBENGA, as well as the Americans PHILLIPS, LARDY, HEIZER and RUPEL, advise determining the content of ascorbic acid (always present, although in varying quantities) in the sperm, as it is a substance which causes the reducing process. Other investigators, starting from the same principle, have proposed the determination of the glucose content (glycolytic test) or else the acidity which would express the anabolic intensity. The estimation of the pH of fresh sperm as a means of evaluating the fertilizing capacity of spermatozoa, however, would only seem to present a limited significance (BERTAGNI, BRIGATTI and RIMOLDI).

From the histological viewpoint, the proportional estimation of acidophilic or basophilic spermatozoa, as well as the transition forms would be useful (BONADONNA and FUMAGALLI) The solution of the problem of the maturation of the spermatozoon, the presence of the 'lipoid capsule' and its relative position along the spermatozoon would be conclusive (RETZIUS, REDENZ, LAGERLÖF, FEILING, SELIVANOVA, MERTON, SCIUCHETTI, etc.).

The problem of the biological examination of sperm from the sanitary viewpoint is still far from having been solved, despite the results obtained by LAGERLÖF and a few others The fact that germs (bacteria and protozoa) have not been discovered on microscopical examination is not sufficient to exclude their presence which may be hidden by the multitude and motility of the spermatozoa.

The ordinary biological or culture examinations are rendered difficult by the impossibility of collecting sperm biologically suitable for the purpose (CAPORALI).

## V. — Rational use of breeding animals

Artificial insemination enables the male animals to be utilized for a larger number of females, distant from each other, without overworking the male from the sexual viewpoint; consequently, the causes of oligospermia, azoospermia and aspermatism are avoided. With artificial insemination, one ejaculate, pure or diluted, sufficies on an average for: 10-15 cows, 10-20 ewes, 5-10 mares, 5-10 sows. With artificial insemination, therefore, one male breeding animal is sufficient for 1,000-1,500 cows (as against 70-100 with natural service), for 150-200 mares (as against 50-70 with natural service), for 100-120 sows (as against 20-30 with natural service).

The chief factors which contribute towards maintaining the male sexual activity at the highest possible level, especially during the breeding season, are: and adequate diet rich in proteins, minerals and vitamins (SUTTON, LAMBERT,

OSICENKO, MILAVONOV, PERRY, POPOV and OKULICEV, KIRILLOV, GIULIANI, etc.), ample exercise (SLOVTZOV and SCAPIRO NAGAEV, HAMMOND, MARSHALL, DAVIS, etc.) and proper upkeep under hygienic conditions.

As regards fecundity, the sexual management to which the male breeding animal is subjected is of considerable importance in regard to individual spermiogenesis (WYK, ALIFANOV, KISSILEFF, ANDERSON, BURCH, SCHNEERSON and LUKINA).

It has been found that often, especially if the operator is a beginner, the irrational exploitation of the male animal and the want of technical experience (too frequent repetition of coitus, contusions or injuries to the male reproductive organs, etc.) are the cause of obtaining poor quality sperm and exhausting the male which resists further attempts at instrumental collection.

The disadvantage of too frequent collection and its harmful consequences may be avoided by assuring a period of sexual rest according to breed, age, season, feeding and individual, and by regulating the number of females to be inseminated artificially. An endeavour should also be made to economize the sperm obtained by suitable dilution and preservation from one day to another.

Several investigators (HAMMOND, SOLDATENKOV and SCHNEERSON, BERLINER and WARBRITTON) appear to have obtained good results, regarding the renewal and vigour of male sexual activity, by the injection of large doses of prolan (2,500-7,000 R. U.) and also large doses of vitamins A, D and E (NEVES E CASTRO). Our researches would prove, in this respect, the importance of the inoculation of the testo-hormonized blood serum of which we have already spoken. P. PHILLIPS reported advantageous results with the bull after strong injections of ascorbic acid (1-2 gm per 1000 lb live weight).

The application of artificial insemination would have excellent results if it were possible to regulate at will the heat period in females and also the mating period in species with seasonal heat periods. This aspect of the question has been studied with encouraging results by inoculating, in general, hormone products (prolan, blood serum of pregnant female) into ewes (McKENZIE and TERRIL, ANDERSON, KOMJAKOVIC and SASENOK, etc.), sows (FAIERMARK and ZAVADOVSKY), rabbits (Japanese workers).

In applying artificial insemination to cattle, in Italy, with one sole intervention, on an average, 60-90 per cent. impregnations were obtained, according to the health condition of the female genital organs and the medical treatments employed. With ewes, 80-90 per cent. were settled with diluted sperm. With mares, when it was possible to control the sexual cycle and repeat fertilizing operations during the oestrus period, 75-80 and over impregnations were obtained. With sows practically 90 per cent. impregnations were obtained with the inoculation of pure sperm, and also filtered and diluted sperm. With hens, by introducing the sperm into the oviduct, 90-100 per cent. fertile eggs were easily obtained.

In general, the application of artificial insemination gives a fertility rate at least equal to that obtained with natural service, with the advantage that a larger number of females are fecundated with the same ejaculate. In fe-

males of impaired fertility or affected by lesions in the primary genital passages (not the uterus or annexed parts) it is possible to obtain about a third more impregnations than with natural service.

As regards the health of the breeding animals, all investigators agree that no harmful effects are caused provided that the technique is applied rationally. The male or female breeding animals which have been used for several years for artificial insemination continue, the first, to effect both natural and artificial ejaculation, while the second continue to conceive alternatively both through natural service and artificial insemination, giving birth to young, normal and vital. From the veterinary aspect, the active participation of the female in the orgasm of coitus so as to stimulate conception seems to be a factor of little importance, contrary to the case, according to BELONOSCHKIN, in the human species. The heat period of female animals, in fact, only seems to be a phenomenon of an endogenous basis, the purpose of which would be to attract the male to copulation by the presence in the ovary of the ripe follicle. Nevertheless, NEVES E CASTRO consider that the erotic stimulation of the mare, obtained by an expedient *ad hoc* facilitates conception in the case of artificial insemination.

Most workers exclude that artificial insemination has a harmful effect on the animals born through this process and that it may cause degeneration of the breed (EDWARDS, OLBRYCHT, FUCHS, STOLZ, HOWARD, CLAPP, WALTON, HAMMOND, MUNRO, GÖTZE, IVANOV, HERBST, GELLHORN, ANDERSON, ROUX, TEODOREANU, etc.) MELCHIORRI, BERGEN, IVANOV and other investigators have furnished data on the life and services rendered by animals born through artificial insemination during several successive generations (trotters and draught horses, male and female breeding animals). According to ABELEIN, the animals bred from artificial insemination should only be utilized for slaughter, because of the possible degenerative influence of the external milieu on the chromosomic properties of the spermatozoa.

The results of the studies of HAMMOND and WALTON on the artificial crossing of Shetland ponies and shire-horses, and the observations of BONADONNA on dogs and horses would prove that, in the case of a considerable difference of size between the male parent and the female, the progeny at birth are of a size in correspondence with that of the maternal breed, and that it is only after weaning that genetic differences tend to make their appearance. SORENSEN and BONADONNA reported in cattle, and FALCOIANU in ewes, a tendency to a larger proportion of males in animals born from artificial insemination, although as cause, hasard or heredity should not be excluded, taking into account the increased number of progeny from one male breeding animal.

## VI. — Aims and organization of the application of artificial insemination

The enthusiasm aroused by a new and original system like artificial insemination may also give rise to excessive illusions and hopes superior to reality.

The purely experimental phase has been surpassed and the present technique is sufficiently simple and easy. Nevertheless, the limits of application to ensure

technical and economic success should be observed, and the necessity of continuing studies on the question is evident with a view to improving still further the methods employed and to utilizing the new system for a new means of biological research.

Artificial insemination is primarily a supplementary method and not substitutive or in some way generalizable and continuative. It may advantageously be applied:

(1) in the scientific field for studies on reproduction and on spermiogenesis;

(2) in the prophylactic field for the purpose of limiting and even preventing the spread of diseases of the genital organs transmitted through coitus (trychomoniasis, coital exanthema, etc.) by avoiding direct contact between the two sexes (IVANOV, HENDERSON, GÖTZE, KUST, HOFMANN, RICHTER, HADJIDIMITROFF, HATZIOLOS, OLBRYCHT, FEILING, ALTARA, PELI, ANTONELLI, POSTIGLIONE, SÖRENSEN, VAN DER PLANK, SIEBENGA, WALTON, MILOVANOV, HAMMOND, GARLICK, MILCIADES MARTINEZ, DE CROUTTE, etc.); for the prophylaxis in certain cases of infectious diseases in general (KUST, DE PAOLIS), as the displacing of the animals, direct contact, etc. are avoided and finally as a means of combatting female and male physiological and pathological sterility;

(3) in the field of zootechny, to increase the possiblities of utilizing the male breeding animals, both as regards time and distance, when their number is insufficient or it is a question of highly valuable animals, and when it is desired to fertilize a larger number of females or carry out some special selective program or else crossings.

The advantageous of artificial insemination in the field of hygiene are the most immediate and are not questioned even by those who are opposed to this method. In the field of zootechny, the system meets with some hostility and distrust generally owing to the incomplete knowledge of the method, its technique and possibilities, unless it is a question of private interests of limited importance. GÖTZE asks whether the extension of the male procreative capacity does not become harmful if the breeding animal is of champion class. Some breeders of the yearling bull producing regions (Switzerland, Holland, United States) are contrary to this method for the fear of the demand in bulls dropping. Race-horse breeders are refractory to artificial insemination as they do not desire an increase in the number of progeny of very valuable racehorses.

DE DOMINICIS, on occasion of the second meeting of veterinary surgeons on artificial insemination, held at Foggia in 1940, called attention to the fact that the application of artificial insemination depends directly on the technical training of the operators and appropiate organization.

In Italy, as a result of a Ministerial Decree (1938) of the Ministry of the Interior (Department of Public Health), artificial insemination may be practised solely and exclusively by veterinary surgeons. The Lazzaro Spallanzani Institute of Milan established in 1937 and attached to the Ministry of the Interior, has special, didactic functions and for propaganda; it is charged with the technical training of veterinary surgeons by means of bi-monthly courses which are also attended by foreign veterinary surgeons. Special instruction

for veterinary surgeons is also given in Bulgaria, Portugal, Denmark and some South American Republics.

Data, even approximate, for the establishment of statistics on the development of artificial insemination in the different countries and on the results obtained with different animal species, are still wanting. An enquiry made in 1938-39 by the Institute of Milan revealed that the interest aroused by the method is everywhere very marked. Not only in Russia, but in other countries, remarkable results have been obtained in practice.

In Denmark, according to SÖRENSEN, artificial insemination was applied to approximately 200,000 cows, through the agency of some fifty Breeders' Associations. The first of these associations founded for the exploitation of first class bulls was established by GJYLLING HOLM in 1936. Each of these associations have one or more veterinary surgeons and count on an average from 1200 to 1500 registered cows, sometimes 3000 and even more. The stockbreeders who are members of an association of this type are required to pay a certain subscription per year and per animal, subscription proportional to the value of the male breeding animal employed (about 20 Danish crowns on an average, sometimes as much as 30 crowns, when the bulls are of special value) with right to a maximum of 4 artificial inseminations (for each supplementary application an extra 5 crowns must be paid), treatment for sterility and diagnosis of pregnancy towards the sixth week. The payments are made directly by the dairy where the stockbreeder delivers the milk. The association with the subscription funds sees to the purchase and upkeep of bulls, meets the expenses relative to the application of artificiel insemination, pays the salaries of the veterinary surgeons attached to the establishment, telephone charges for daily communications with the stockbreeders and the cost of studies and ressearch work on artificial insemination. The different associations are combined into a federation to facilitate the exchange of bull sperm. The bulls are looked after by the breeders who are paid a certain sum per year (in 1939, 600 Danish crowns per bull).

The veterinary surgeons attached to the establishment effect artificial insemination by going to the adhering members in chronological order of the calls received each morning by the association and who communicate, *inter alia*, the number of cows in heat. The sperm is collected from the bull or bulls of the association where they are placed and the seminal material is transported in thermos flasks. Danish organization and the results obtained are both interesting and convincing.

In the United States, based on the Danish example, PERRY founded in 1938, the first breeders' association for the application of artificial insemination: The New Jersey Holstein-Friesian Cooperative Association. On April 15, 1939, the Cooperative Artificial Breeding Associations numbered 17, divided among 10 States (Connecticut, Maine, Missouri, Minnesota, New York, Wisconsin, New Jersey, Ohio, Pennsylvania, Tennessee) each counting on an average 76 members, 855 cows and 5 bulls. The Central Maine Artificial Breeding Association at the end of 1940 comprised 250 members for a total of 400 cows. The number of associations at present in existence would seem to be

about fifty. The organization and purpose of these associations are the same as in Denmark. According to an enquiry of the Journal of the American Veterinary Medical Association made in 1939, the organization of these associations everywhere was satisfactory as also the services rendered to the members. The adhering members are generally required to pay a registration fee (on an average 5 dollars) and annual subscription for the artificial insemination of each cow (from 3 to 5 dollars) giving right to three inseminations between one calving and another and a diagnosis of pregnancy. Supplementary payments are arranged for treatment of the genital organs if the veterinary surgeon has the time (one dollar) and for visits or special treatment.

Already in 1938 several Pure Breed Record Associations had taken special measures with a view to guaranteeing pedigree purity by employing artificial insemination. Still more recently, the Breeds Relation Committee (Production Section) established the regulations to be followed in the registration of the progeny of milch cows obtained through artificial insemination.

The Farm Security Administration subsidized the stockbreeders and the Department of Agriculture has established officially a standard regulation for associations of this type. The Central New York Breeding Association is the most important of all the associations for artificial insemination. It was constituted for the purpose of grouping several small breeders' associations counting at least 300 cows of the same race. The Central Association with headquarters at Amboy (N. Y.) near the Syracuse airport, deals with the upkeep of bulls on behalf of the said associations, to which are dispatched daily the sperm in the amounts required and suitably preserved in thermos flasks. On August 1, 1940 six associations situated at Jefferson, Cartland, Madison, Onondaga and Livingstone, counting 3,700 registered cows, joined. At Christmas, 1940, the extension of services to approximately twelve associations for 10,000 registered cows was anticipated; each member of one of the adhering associations would spend the first year and for 10 cows to be artificially inseminated, the sum of 65 dollars, representing 5 dollars for the registration fee, 5 dollars, according to the tariff, for each cow (with right to 3 artificial inseminations) and an initial contribution of 1 dollar per cow the first year.

In the United States, several research centres and numerous investigators are engaged in the study of the problem of artificial insemination.

In Bulgaria, NENKOFF communicates that at Sofia an Institute has been established under the supervision of the Veterinary Department of the Ministry of Agriculture with the object of diffusing the practice of artificial insemination and combatting animal diseases. At Sofia there is also a laboratory, attached to the surgical clinic of the Faculty of Veterinary Science, for artificial insemination with a view to collaborating with veterinary surgeons. The intention is to practise artificial insemination on sheep on a large scale beginning in the autumn of 1941.

In Rumania, this system has been extensively applied since 1936 (SCHOTTLE) chiefly with a view to 'karakulizing' the sheep stock. These investigations have been carried out by the 'Facultatea de Stiinţe Agricole' at Chişinau and by the Institute for Agricultural Research at Bucharest (CARDAS,

BAICOIANU, PASCOVSCHI, NICA and co-workers) and also by the 'Institutul Zootechnique' (FALCOIANU and collaborators) and also elsewhere. In 1939, in Bessarabia alone, 13 centres were in operation and 8,122 ewes were artificially inseminated. In 1939, 15,000 ewes are said to have been artificially inseminated (FAICOIANU).

In England, the School of Cambridge (HAMMOND, WALTON and their co-workers) have made a decisive contribution to the scientific study and methodology of the problem of artificial insemination. On January 1, the Ayrshire Cattle Herd Book Society decreed special regulations regarding the admission to the Herdbook of animals obtained by artificial insemination. Similar measures were taken by the British Friesian Cattle Breeders' Society and the Shorthorn Breeders' Association. The Institute of Animal Genetics at Edinburgh, the Hannah Diary Institute of Ayr and the School of Agriculture at Cambridge have been authorized to grant certificates testifying that artificial insemination was carried out and indicating the origin of the seminal material employed. The South Devon Bull Recording Society appears to be the first, in 1938, to have practised artificial insemination with the sperm of one of its most valuable bulls.

In Portugal, NEVES E CASTRO established the first centre of artificial insemination at the School of Veterinary Science and is preparing to execute an extensive program of action, particularly in the Portuguese colonies.

In Guatemala, the 'Sección de Veterinaria, Higiene y Sanidad Animal' began in 1938 the installation of a 'Estación Nacional de Fecundación Artificial' for domestic animals in the Zoological Garden of Guatemala.

In Argentina, artificial insemination is considered as a problem of the highest importance, especially in sheep-breeding. GARCIA MATA and CANO in 1941 reported the favourable results which were obtained with the application of this system in a flock of 6,300 ewes in the Province of Buenos Aires. SBARIGGI organized an 'Instituto para Fecundación Artificial y Diagnóstico Precoz de la Gestación' attached to the Faculty of Veterinary Medicine at La Plata.

In Brazil, JORDÃO teaches this method to the students of the 'Escola de Agronomía e Veterinaria', while the 'Departamento d'Industria Animal' has established an experiment station for artificial insemination.

An experiment section for artificial insemination is also being planned at the School of Agriculture at Santiago (Chile).

In Kenya, ANDERSON, veterinary Research Officer of the Experimental Station, has given considerable study to the question. Particularly convincing are the results obtained in the control of contagious epididymitis of cattle and in the improvement of the cattle and sheep in the Native Reserves and also in bovine-zebu crossing carried out at the Veterinary Training Centres in Kenya.

In Japan, the study of artificial insemination and its application were undertaken by ISIKAWA as early as 1912 at the Physiological Institute of the Kyoto Imperial University. His pupils and collaborators (YAMANE, OCHI, SATO, SHIMAMURA, ITO, TOMONORI, etc.) have largely contributed to the improvement of the knowledge available on artificial insemination and on reproduction phenomena in general.

In Italy, the first experiments on artificial insemination were carried out by PIROCCHI on bovidae (1914), by GALLICI (1914) and POSTIGLIONE (1921) on equidae. Towards the end of 1935, the Italian Ministry of Agriculture and Forests instituted a special Commission for the coordination of studies on artificial insemination, presided over by PIROCCHI. Another Institute for artificial insemination is in operation at Bologne and all the zooprophylactic Experiment Stations of the Kingdom take an interest in this problem within the limits of their province and especially from the health standpoint.

The Ministry of War continues the application of artificial insemination at the Remount Centre and with the Persano breed (Salerno). In Libya and Italian East Africa, numerous centres have been established, chiefly attached to the 'Sierovaccinogeni' Institutes.

The Ministry of the Interior (Department of Public Health) has, since the beginning facilitated the diffusion of this system and, in 1938, regulated its application by Ministerial Decree as follows:

(1) The centres for the application of artificial insemination should have premises for the execution of the operations in questions which correspond to the methodological and hygienic requirements as well as the necessary equipment.

(2) The management of the said centres will be entrusted to veterinary surgeons of recognized competency in the subject and the staff should also have had a sufficient training.

(3) The operation of all centres for artificial insemination is subordinate to the preliminary approval of the Ministry of the Interior, which sends a veterinary Inspector General expressly for carrying out the necessary supervision and control.

The Law for improvement in animal husbandry, decreed by the Ministry of Agriculture and Forests in 1940, provides for the application of artificial insemination and the use, for this purpose, of selected breeding animals registered in the Herdbook. A special regulation is in preparation, by agreement between the Ministry of the Interior and the Ministry of Agriculture, and will be promulgated during the course of 1941.

In the different Italian Departments numerous centres of application have been established with a view to the exploitation of the system from the hygienic standpoint or to the fuller utilization of valuable prize sires. These centres when not privately owned, work on the basis of regulations which differ according to region and local requirements. Practically everywhere, however, the following system has been adopted:

(*a*) Payment of an unsemination tax after a clinical guarantee (with bovidae) or biochemical (with equidae) of pregnancy; this is to increase confidence in the method and the prestige of the technicien;

(*b*) remuneration to the veterinary operator by means of a participation in the interests of the enterprise;

(*c*) adjunction of treatment for sterility to the application of artificial insemination.

Still more recently, the syndical-economic organization of Italian agricultural production (Animal Husbandry Section) in the regulation of the organi-

zation of the Consortia holders of bull service Stations, has also taken account (standard Regulation, approved by the Ministry of Agriculture and Forests) of the possibility of managing directly the centres of artificial insemination.

The organization for application of the system varies according to technical and economic conditions (large, medium and small stockfarms, etc.) and to the aim in view (hygiene, prophylaxis, improvement). In general, the centres of application are organized as follows:

(1) private persons, holders or otherwise of public service stations or studs, associated or otherwise with the veterinary operator may construct from their own resources with or without subvention, the centre of application, they put it into operation in the interest of their own stock or of that of other persons (stockbreeders of the region) and receive the tariff fixed in advance;

(2) local institutions (zooprophylactic experiment Stations, Breeders' Associations, Provincial Consortia of Agricultural Producers, Agricultural Inspectorates, etc.) may organize, in the interest of the region, centres of application (for bovidae, equidae and sheep), entrusting the management of the said centres to specialized veterinary surgeons and regulating their working, taking into account the local requirements.

In Italy and the Italian colonies, there are at present either working or coming into operation, about a hundred centres for artificial insemination, chiefly for cattle. Scattered about, they are particularly numerous in North and Central Italy (Piedmont, Lombardy, Emilia, Tuscany, Le Marche) also in proportion to the diffusion of diseases of the genital organs (trychomoniasis, brucellosis) The Zooprophylactic Experiment Station at Foggia (DE PAOLIS) has begun experiments on the 'karakulization' of a flock of ewes ('moscia') numbering over 1500. Further research studies are being made on the use of Prolan to bring the ewes on earlier in heat.

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# *MISCELLANEOUS INFORMATION*

## Vitamin C deficiency in the Army

The impartial observer who studies the important newspapers of the international press cannot fail to be impressed by the considerable space dedicated to the restriction of food supplies which now prevails in all the countries of Europe. Everywhere it is a question of meeting the deficiencies in food supplies which are undoubtedly arising owing to difficulties in the production and distribution of food and to the obstacles encountered by those authoritites responsible for the health of both civilians and the fighting forces.

Both agriculturists and doctors must face the difficulties which have arisen owing to the war, the first, because theirs is the mission to increase the production of the soil; the second, because their task is to prevent and cure sickness. Great interest in the question of vitamin deficiency is shown today everywhere and not only as formerly in restricted scientific circles. For example, the metabolism of vitamin C (antiscorbutic) presents a particular interest in great collective bodies of human beings, above all in the armed forces, seeing that here it is a question of strong young men, apparently in good health.

*With a view to establishing the importance of vitamin C deficiency among men under arms and in order to know whether this deficiency depends upon the type of food supplied to the army*, M. DEMOL (*) has studied the metabolism of vitamin C among Swiss soldiers of three sections, a total of 94 men belonging to three units differing as to their canton, their unit, and their age. In order to establish the amount of vitamin

(*) Communication passed to the Swiss Gastro-Enterology Association. *Zeitschr. Vitaminf.* II, 2, 1941.

C in the soldiers' food, the author calculated the amount of ascorbic acid which the soldiers of a battery received in two weeks, from March 18 to 31. The soldiers of the Swiss army receive plenty of food of a high energizing value (3,000-3,900 calories), and a certain number of the men even put on weight during their period of service; but the calory value of a diet is not everything, and it is also necessary that this diet be balanced by a sufficient quantity of vitamins. Many kinds of food provided for the soldier—bread, cheese, rice, macaroni, sugar, chocolate—do not supply vitamin C, which is contained in the following

| Food | Quantity (g) | Vitamin C Mg % | Vitamin C Mg per ration | Number of rations in 2 weeks | Quantity of vitamin C in 2 weeks |
|---|---|---|---|---|---|
| Milk | 300 | 2 | 6 | 16 | 100 mg |
| Meat | 225 | 1.5 | 3.5 | 14 | 50 |
| Potatoes | 300 | 10 | 30 | 10 | 300 |
| Green salad | 70 | 3 | 2 | 5 | 10 |
| Cabbage | 300 | 30 | 100 | 4 | 400 |
| Jam | 50 | 20 | 10 | 2 | 20 |
| Lentils | 250 | 20 | 50 | 1 | 50 |
| Spinach | 400 | 8 | 30 | 1 | 30 |
| | | | | Total . . . | 960 mg |

The soldier receives vitamin C chiefly from green vegetables and potatoes. The green vegetables consist of cabbage which must be cooked for a long time in order to be digestible. But this cooking eliminates the greater part of the antiscorbutic properties. The other products such as fruit do not form a regular part of the food supply of the Army and the soldier is thus practically deprived of his principal source of vitamin C. With regard to the potato, storage in unfavourable conditions is a cause of vitamin loss in addition to that which arises owing to cooking. The raw potato contains 20 mg. of vitamin C per 100 g. Lightly cooked or fried, it loses as much as half its vitamin C. If cooked for six hours it has no vitamin C left. On the contrary, if cooked in its jacket it retains all its antiscorbutic properties. 100 grams of raw cabbage contain 100 mg of vitamin C but if the cabbage is cooked for fifteen minutes the ascorbic acid content falls to 30 mg. per cent. If the cabbage and potatoes have lost almost all their antiscorbutic property, the daily ration of the soldiers contains hardly any ascorbic acid (20 mg.)

The author, in thus adopting the figures of 10 mg. per cent. for potatoes and 30 mg. per cent. for cabbage is going on the assumption that these two vegetables are cooked for only a short time. This is rarely the case in the Army where meals are prepared in advance and often kept for hours at a stretch in the auto-cookers. The manner in which the food supplies are dealt with and the length of the periods of their cooking consequently play an important part.

Milk consumed every morning to the extent of 3 dl. and sometimes at the evening meal, represents a contribution by no means negligible. But, on the contrary, green salad, on which one seems to count so much, contains only 2 mg. of vitamin C per ration.

It is, however, of less importance to estimate the contribution of the vitamin in itself than to determine the significance of its deficiency as seen in the needs of everyday life.

These problems have by no means escaped the notice of the Army Medical Service which on several occasions has called the attention of the doctors and the authorities responsible for the food supplies to these fundamental principles of alimentation and the preparation and consumption of food.

It is generally admitted that 0.05 g. of ascorbic acid daily is sufficient. This figure is certainly far below that necessary to an organism exposed to physical effort. All those who have studied the question in the armies of foreign countries are of this unanimous opinion. The author has been able to determine approximately the amount of ascorbic acid which a man obtained in his food in two weeks, *viz.*, 960 mg. which divided by 14, equals 68 mg. vitamin C for each man daily.

Over and above the quantities just sufficient to cover the necessity it is of great importance to give the subjects more than enough, because soldiers who are well set up in vitamins offer a better resistance to epidemics such as influenza, pharyngitis, etc. Measures taken towards the prevention of scurvy by means of the author's saturation tests have given the following results:

| Section | Quantity of Vitamin C taken | Non saturated: number | Non saturated: % | Saturated: number | Saturated: % |
|---|---|---|---|---|---|
| (*a*) | 0.3 g | 25 | 89 % | 3 | 11 % |
| | 1.5 | 19 | 73 | 7 | 27 |
| | 3.1 | 6 | 34 | 12 | 66 |
| (*b*) | 0.3 | 34 | 97 | 1 | 3 |
| | 1.5 | 30 | 94 | 2 | 6 |
| | 2.7 | 14 | 52 | 13 | 48 |
| | 4.3 | 2 | 10 | 18 | 90 |
| (*c*) | 0.3 | 30 | 97 | 1 | 3 |
| | 1.2 | 28 | 97 | 1 | 3 |
| | 2.4 | 17 | 59 | 12 | 41 |
| | 4.0 | 6 | 25 | 20 | 77 |

The author shows that only 11 per cent. of the subjects have a deficit of less than 1.2 g. of ascorbic acid and may therefore be considered completely normal. The zone limit (between 1.2 and 2.4 g.) comprises 32 per cent. of the cases. It thus follows that a quantity superior to 2.4 g. of vitamin C would have been necessary to saturate 57 per cent. of the men whom the author had under observation. Thus more than half of these soldiers showed a condition of unquestionable vitamin deficiency.

Swiss dentists have noticed the influence of this deficiency in the aggravation of the evolution and frequency of caries and paradentosis. Furthermore, the author insists that the alimentation of the army, which is rich in carbohydrates (600-700 g. per day), demands a still greater quantity of vitamin $B_1$, and he points out that the addition of 1 mg. of aneurin (vitamin $B_1$) to the ascorbic acid favoured the return to equilibrium of the metabolism of vitamin C.

In summing up his interesting researches carried out among the Swiss soldiers, the author concludes that

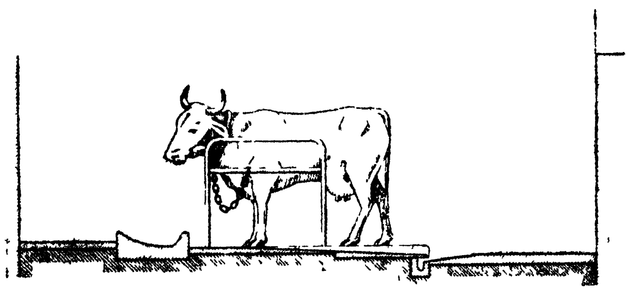
(1) Vitamin C deficiency is very considerable in the army, much more so than among the recruits, (2) the food supply of the soldier theoretically contains a sufficient quantity of ascorbic acid but that in reality the amount is very insufficient owing to the prolonged cooking of the meals and the very high vitamin C requirement of men on active service

## Improved system of urine evacuation from stables

In keeping stables clean, the main thing is the rapid evacuation of the urine This should remain as far as possible separate from the excrement, as the mixture of the two accelerates the decomposition of the urea and thus reduces the fertilizer value of the urine, without taking into account that it vitiates the air of stables and is harmful to the health of the stock

In most stables, the evacuation channel for urine lies between the passage for urine for the evacuation of the dung and the passage for the stable hands This

FIG. 1. – Transverse section of a stable showing the urine evacuation channel covered by the end extremity of a stall (the size of the cow is slightly too small in comparison with the rest of the design).



arrangement, however, does not as yet assure a rapid separation of the dung and the urine, so that frequently ammoniacal exhalations cannot be avoided.

Where housing and stabling are combined under the one roof without being separated by a space acting so to speak as a lock shutting out all odours, the exhalations from the stables invade and taint the living quarters To remedy this situation, a country curé in the Marche (Italy), TEMPESTINI realized a new system of urine evacuation for the stables of his parishioners, the utility and simpleness of this system soon drew attention.

According to this patented system, the urine evacuation channel does not lie between the passage for the evacuation and the passage for the stable hands, but at the end extremity of the stalls. This extremity overhangs the urine evacuation channel, 4 cm. wide, and also overlaps by 5 cm the edge of the dung evacuation passage, separated from them by a space of 2 cm. Thus the urine evacuation channel is covered by the end extremity of the stalls and precedes the dung evacuation passage, slightly inclined towards it.

In order to accelerate the draining of the urine, the evacuation channel is more inclined than normal, without its lower level presenting any changer to man or beast as it is covered.

As regards the stalls, they are completely horizontal, contrary to the usual system, in which the hind third is slightly inclined, and have grooves placed longwise 30 cm. apart and branching off laterally, these terminate above the dung evacuation passage and have a difference of level of 7 cm The groves are intended to evacuate the

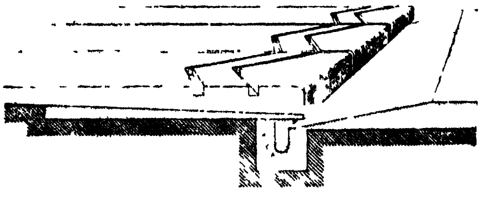


FIG. 2 – End extremity of a stall covering a urine evacuation channel (TEMPESTINI system) showing grooves carrying urine to the channel

urine without the stall of the animal loosing its horizontality being more healthy than the type slightly inclined at the hind end.

For this installation to function properly the urine evacuation channel must be cleaned from time to time; this can easily be done by means of a curved iron wire.

After having been tried out for several years, the following advantages may be attributed to this system (1) pure air and cleanness of the stable - (2) the urine can be rapidly separated and collected, without risk of ammoniacal exhalations and consequently no loss in fertilizer value - (3) considerable economy in straw litter - (4) economy in stable space — (5) improvement in the health of the animals through purer air, greater cleanliness and complete horizontality of the stall which remains dry.

H J.

Prof. UGO PAPI, *Segretario generale dell'Istituto, Direttore responsabile.*

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# MONTHLY BULLETIN

OF

# AGRICULTURAL SCIENCE AND PRACTICE


## MEASURES AND PRACTICES FOR CONTROLLING EROSION AND CONSERVING WATER


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*The intelligent application of conservation practices on the farm in order to prevent erosion and conserve water depends primarily on the physical condition of the land, the nature of the soil, the extent to which erosion has progressed, the topography of the land, and the economic situation confronting the farmer. This paper describes the manner in which the various conservation measures are applied to individual farms in the work of the United States Soil Conservation Service. This technique has been developed by applying research results and by evaluating conservation measures in operations during the past eight years.*


### Securing information on the physical resources of each farm

The first step in installing a system of conservation farming on the land is to secure information concerning the physical resources of each farm. A map of the farm is necessary so that the soils, slopes, and progress of erosion may be charted for future use. Mapping of such information requires familiarity with the soils of the particular locality, and an experienced man should be able to prepare in half a day a map containing all necessary information on a farm of 160 acres.

The difficulties experienced in applying conservation practices of sufficient quality to insure erosion control and permanent agriculture have brought about the development of "minimum requirements" necessary to apply to land in order to insure permanent productivity. In other words, it is necessary to determine how intensively land may be cropped without serious loss of top soil through erosion, loss of organic matter, or other deterioration that causes loss of fertility. The numerous variations in productivity and erodibility of soils, together with variations of slope, progress of erosion, climate and other factors, combine to make the development of minimum treatment requirements for the use of land a difficult and complex task. A set of minimum requirements must be prepared for each problem area in order to insure a sound program in application. The careful preparation of such standards removes the element of "personal opinion" and puts land use planning on a sound ecological basis.

### Classification of land according to its use capability

As an aid in the development of recommendations for minimum requirements of practices, land is first classified according to its use capability. Eight land classes have been established on the basis of physical factors in relation to practices, and these are enumerated and defined as follows:

*Land suitable for cultivation*

Class I. - Land that can be cultivated permanently and safely without the need of special practices or treatments. (It is assumed that commonly recognized good farming methods will be used on this as well as all other classes of land)

Class II. Land that requires one or more special practices if it is to be cultivated with safety. These special practices may include contour tillage, strip cropping, the removal of stones that interfere with cultivation, underdrainage, or any other operation that may be necessary

Class III. Land that requires complex and intensive control measures if it is to be cultivated safely and permanently. This land requires a higher degree of skill in selecting and applying the appropriate measures of protection than the land in Class II.

Class IV. Land not suitable for permanent cultivation. An intertilled row crop might be grown occasionally, perhaps one year out of ten, as a step toward the renewal of a stand of grass for permanent pasture. Land too steep to risk an occasional row crop that might be used for annual legumes or close-growing grains, provided that these crops give effective cover when it is most needed

*Lands not suitable for cultivation*

Class V. Land that is not susceptible to deterioration if covered with permanent vegetation. Although this land cannot be cultivated at any time, it may be used as grazing land or woodlot without restrictions in use or special practices.

Class VI. - Land that is moderately susceptible to deterioration, even under permanent grass or trees Although this land may not be cultivated at any time, it may be used as grazing land or woodlot with moderate restrictions in use, with or without special practices.

Class VII. Land that is highly susceptible to deterioration, even under permanent grass or trees. This land is subject to severe restrictions on any kind of agricultural use, with or without special practices.

*Lands not suitable for any productive agricultural use*

Class VIII. - Lands not suitable for cultivation or for the production of any permanent vegetation.

Having such a use capability outline to follow, the next step is to determine in any problem area the land that should be included in each class. A

careful study of all available information on the soils in the area is necessary, and it is essential that the various State and federal technical agencies concerned with land use problems be consulted regarding the establishment of treatment recommendations. Actual information of value in preparing this more or less arbitrary classification and the treatment recommendations is all too meager, and some flexibility in the recommendations is important, not only from the standpoint of securing additional information through practice, but also in the application of the program to the land.

Soil types may be placed in only one use capability class, or in several. Class I consists mainly of quite level land, not subject to erosion. A soil on land with 0-3 percent slope might be grouped in Class I, if sufficiently productive, but the same soil with a slope of 8-15 percent might fall in Class III Poor drainage might require a perfectly level soil to be placed in Class V instead of Class I. A severely eroded condition might require a soil to be placed in Class III or IV that otherwise might qualify Class II.

*Land treatment according to use capability*

| Land Class | Land Use | Crop Rotation | Supporting Conservation Practices |
|---|---|---|---|
| I | Crop | CG(Sc)CGH | None |
| II | Crop | CGHHHH | None |
| | Crop | CGHH | Contour tillage |
| | Crop | CGGHH | Contour strips 100 105′ |
| | Crop | CGH | Terraces |
| III | Permanent hay | CH | None |
| | Crop | CGHHHHH | Contour tillage |
| | Crop | CGHH | Contour strips 60-100′ |
| | Crop | CGGHH | Terraces |
| IV | Pasture | | None |
| | Permanent hay | GH | Contour tillage |
| | Crop | GGHHHH | Contour strips 50 60′ |
| | Crop | CGHHHH | Terraces |
| V | Pasture | | Regulated grazing |
| | Permanent hay | GH | Contour strips 50 60′ |
| | Woodland | | Protection |

Explanation: In the symbols under "Crop Rotation", C means a cultivated crop, G means grain crop, H means hay, Sc means sweetclover. A rotation, CGHH, means a cultivated crop, followed by grain, followed by two years of hay. The rotation, GH- - , means a grain crop followed by hay indefinitely; where it becomes necessary to reestablish, it is advisable to plow in contour strips, leaving alternate strips in sod to prevent washing and reestablishing the alternate strips another year. All land should be limed and fertilized according to soil tests

It is important that recommendations for land treatment according to use capability be confined to definite problem areas. The inclusion of too much territory generally brings in so many soil types and such a variety of climatic and physiographic conditions that the recommendations become too general to be of real value. The closer the recommendations fit the individual farm, the more valuable they become

An illustration of recommendations for land treatment according to use capability for an area in southern Minnesota is given in the following table Approximately forty soil types are found in the area Slopes vary considerably, and there are all degrees of erosion. There is little if any variation in climatic factors.

It will be noted that in the above table, considerable flexibility in land treatment is afforded. Class II land can be maintained with a rotation of corn, grain, and 4 years of hay without any special practices. If, however, the farm economy requires a 3-year rotation of corn, grain, and hay, the land should be terraced. An intermediate rotation of corn, grain, and 2 years of hay would require only contour tillage Flexibility also is found in the recommendations for Class III and IV land Naturally, the higher percentage of cultivated crops to be produced, the greater need for supporting conservation practices. Flexibility in treatment does not give considerable opportunity for a farmer to choose the type of farming he prefers and enables him to adjust according to the economic requirements.

## List of practices of soil and water conservation

The conservationist has a long list of tools or practices that may be used very effectively in conserving soil and water. While it is seldom that many are required on the same farm, it is very important that the proper ones be selected.

The following is a list of measures and practices of value in conserving soil and water:

1. – Buffer strips
2. – Contour cultivation
3. – Contour fencing
4. – Contour furrows
5. – Contour ridges
6. – Contour strip cropping
7. – Cover crops
8. – Crop rotation
9. – Dams
10. – Diversion dams
11. – Diversion ditches
12. Drainage
13. – Fertilizing
14. – Field arrangement
15. – Forestation
16. – Gully control
17. – Grassed waterways
18. – Liming
19. – Meadow strips
20. – Mowing
21. – Mulching
22. – Outlets
23. – Pasture management
24. – Range management
25. – Revegetation
26. – Spillways
27. – Terrace outlets
28. Terracing
29. – Tillage practices
30. – Water spreading devices

## Farm planning

The economic phases of farming naturally must be given careful consideration in farm planning. The farmer may wish to raise livestock as a means of livelihood, in which case the plan should be developed to supply ample feed – pasture, hay, and grain – with sufficient reserve production to insure an adequate feed supply even in adverse years. The size of the farm, proximity to market, soil types found on the farm, topography of the land, the climate, and many other factors as well as the farmer's own desires must be given full consideration. Once the decision is made as to type of farming to be followed, then the field arrangement, crop rotation, pasture program, woodland management, and other problems of application can be considered. The actual practices to be applied in order to effect soil and water conservation will then need to be brought into the picture.

The application of conservation practices to a farm can be made a burden to the farmer, but by careful planning it can be timed to interfere very little with his normal farm operations. A common mistake made in the first years of the soil conservation program was attempting to get the entire program installed on the farm in two or three years. Naturally, the time required depends on the amount of work to be done, but in many cases it may require eight or even ten years.

A very practical procedure and the logical one to follow is to work out the new field arrangement, basing the number, size, and location of fields on the crop rotation to be followed. Naturally, the choice of the rotation to be followed rests with the farmer, using the physical data gathered on the farm as the basis of planning for conservation. The farm map will show the quantity of the various classes of land. From this information, it is possible to determine the land that should be cropped and the land that should remain in or be returned to permanent vegetation. Any rearrangement of fields should be based on the land-use capability classes, as indicated on the farm map. This is one of the principles of proper land use.

After the field arrangement is decided upon, the water disposal system of the farm should be given consideration. Some fields or portions of fields may need to be terraced, but terrace outlets or grassed waterways should be planned and established before terraces are constructed. The disposal of the water from the outlets should be carefully considered, with special regard for the effect that any concentration of water may have on other portions of the farm or on adjoining farms. Necessary drainage, irrigation, or water spreading measures can be planned along with the general water disposal system. In many instances, where a group of adjoining farms has been planned at the same time, real economy has been effected by the construction of one outlet of sufficient size to handle the water from several farms. Wide grassed waterways often may be planned so as to produce valuable hay crops. While such waterways might be useful on a livestock farm, on a fruit farm a narrow outlet would probably be preferable, because it would permit more land to be in fruit production.

**Order of application of the different phases of the program**

It is logical that engineering work – terraces, outlets, dams, gully control should precede the application of the vegetative phases of the program, but not too far in advance since the success of engineering structures depends to a great extent on the proper use of vegetation. On many soils, terraces planned for a rotation of cultivated crops, grain, and hay will fill with silt, break over, and fail completely if cropped continuously to a cultivated crop Outlets prepared for seeding to grass will often be ruined in a short time if water is emptied into them before the grass is established

Fields or areas set aside for trees can usually be planted during the first planting season if labor is available, since engineering work in advance of planting is seldom necessary. However, engineering work must precede planting on gullies and eroded areas where erosion cannot be checked without mechanical support Today the conservation engineer avoids construction work in such areas unless it is definitely determined that vegetation alone cannot handle the problem

Land to be planted to permanent pasture may need contour bedding before seeding, and diversion ditches while grasses are becoming established, in order to prevent erosion The contours are valuable later in holding the water on the land for a sufficient length of time to allow it to soak into the soil Much land retired to pasture is badly in need of lime and phosphate, and in many cases a crop of sweetclover, lespedeza or other soil-improving crop should be added to the soil before the pasture mixture is seeded. It cannot be expected that good pasture can be established on impoverished land Grass needs plant food to make effective growth, the same as any other crop

In most cases, the last - but certainly not the least effective erosion control measure to be completely installed on the farm is the crop rotation. This must await the changing of fences and fields and the installation of engineering work. Moreover, it must not interfere with the continued production of feed and cash crops on the farm during its installation. The actual installation of the rotation depends also on the need for a strip cropping arrangement. Sometimes it is very difficult to get strips installed due to interference from crops growing on the land.

The most important step, perhaps, in installation of a conservation program on the farm – other than the plan itself – is to work out a system for applying the plan to the farm so as not to interfere materially with normal farm operations. A farmer is a hard-working individual without much spare time from his regular duties. However, it has been demonstrated that if the practices are applied in proper order and if sufficient time is allowed to carry out the work properly, the farm begins to assume a new pattern in a remarkably short time.

When the conservation plan is finally applied to the farm and is in full operation, the soil is protected from erosion and the farm operations can the be regarded as more or less permanent – depending, of course, on the degree of care used in developing the plan. The soil is farmed according to the intensity of use to which it is adapted, a point which has received little consideration in the past. A real attempt has been made to work out the farm management angles so the farmer can be assured of a permanent income and a permanent farm.

# COMPARATIVE EFFICACY OF GROWTH SUBSTANCES IN POWDER AND SOLUTION FORM AS REGARDS THE ROOTING OF CUTTINGS OF DIFFERENT PLANTS

J. RAPPAPORT

*The groundwork of this study was obtained at the Division of Plant Physiology of the Botanical Institute, Ghent University (Belgium). The author in a numerous series of experiments, compared the respective efficacy of the process with the dry method and the wet method in treating cuttings with growth promoting substances,* * *and discusses the merits and disadvantages of each. Lastly, he has calculated, for preparations containing β-indolylacetic acid, equivalents in powder or solution form, which give the same effect*

## I. Introductory

Since the application in horticulture of the results of studies on phytohormones in particular, the advantageous effect of different synthetic substances on the rooting of cuttings, different methods for carrying out the treatment in practice have been proposed

Thus LAIBACH (14, 15, 16) invented the Pastamethode, which consists in coating the cuttings with a lanoline paste containing a plant growth substance.

COOPER (3, 4, 5, 6) adopted the solution method, consisting in placing the ends of cuttings to a depth of about 2 cm. in phytohormone solution and allowing them to stand from 12 to 24 hours. The solutions employed contained from 10 to 200 mg. auxin per litre of water.

GRACE (7) evolved the dust method, in which the growth substance, in the dry state is mixed with an inert powder such as talc. The lower ends of the cuttings are dipped in the dust and the cuttings are planted directly. The quantity of powder which remains attached to the cuttings contains sufficient auxin to induce root formation.

Lastly, HITCHCOCK and ZIMMERMAN (10) have recently described a solution dip method which consists in dipping the ends of cuttings for an instant in a very concentrated solution of a root-inducing substance, and then planting the treated cuttings.

Naturally these four methods each have their advantages and disadvantages.

* In regard to growth promoting substances, two articles have already been published on the subject in the *Monthly Bulletin of Agricultural Science and Practice, viz.*: (1) G. STAMPA and C. T. KALE, The present stage of studies on substances stimulating plant growth and the possibilities of their practical application. – 1938 *Bulletin*, No. 11 — (2) J. RAPPAPORT. Possibilities of growth promoting substances in fruit arboriculture. – 1941 *Bulletin*, No. 2.

** *Tec. 12 Ingl.*

Thus the Pastemethode has this advantage that the quantity of auxin given to each cutting can be fairly accurately measured, but this is only of theoretical importance and does not compensate for the disadvantages of this method in practical horticulture. In fact, considerable time is required to coat each cutting with the paste employed. Moreover, it is not possible in practice to put an equal quantity of the paste on each cutting (furthermore, this is not of conclusive importance). Finally, the results obtained with this method have not been satisfactory, consequently, this system is now no longuer employed.

On the other hand, the solution method in which solutions of growth substances are used, is now generally adopted. It has the important advantage that a fairly large number of cuttings can be dipped at the same time in a relatively small volume of auxin solution; moreover, it is easier and quicker to prepare a solution than a paste; it is also more easily measured and the quantity of auxin obtained by each cutting is practically constant. Lastly, this method has besides an economic advantage: the same solution can be used several times for different lots of cuttings of the same type of plant, consequently the cost of the treatment is reduced to a minimum. (For further information on this subject consult the work cited as No. 26 in the bibliographical list).

The only disadvantage of this method for the horticulturist is that he cannot obtain the auxin solutions already prepared as they have to be made just before use seeing that they are not stable.

On the other hand, the optimum proportion of phytohormone must not be exceeded, as an overdosage of only 50 mg. per litre may have a damaging effect, in particular the scorching of the ends of the cuttings followed by withering.

The horticulturist, therefore, must have some means of applying the growth substances to cuttings without having to prepare the solutions himself. He must be able to have a preparation ready for use so as to prevent any miscalculation as regards the quantity of growth promoting substance to be employed. *

In this respect, the dust method of Grace is most satisfactory. It places at the disposal of the horticulturist a powder containing an exact dose of phytohormone ready for immediate use, all that has to be done is to to dip the ends of the cuttings in the powder, planting immediately afterwards. Another advantage of this system is that there is no need for receptacles for steeping the cuttings, etc.

An important advantage of this method is that it can be used for treating cuttings which for some reason cannot be dipped in an aqueous solution as, for example, cuttings of *Azalea indica*, *Ficus australis* and *F. elastica*, *Araucaria* sp , etc.

Despite the advantages which this method seems to offer in practice, there is still room for technical improvement. When dust-treated cuttings are planted

* After concluding this article I learnt that chemically pure growth promoting substances have been placed on sale in tablet form. With these tablets the correct solution can be obtained without any necessity of a precision balance.

in propagating frames, part of the powder adhering to the ends of cuttings is pushed higher up the stem as it penetrates the soil, or else is intermingled with the soil with consequent loss in growth substances.

I have endeavoured to remedy this disadvantage by means of inert gluey substances, soluble in water, which maintain the hormone powder attached to the cutting during planting. There is no necessity to discuss this question further, I refer the reader to my earlier work numbered 26 in the bibliographical list appended

The solution dip method is more recent. As yet little can be said on the subject as it has not yet been tried out on a large scale. According to the originators, this method gives satisfactory results. In my work mentioned above, I expressed the opinion that this method appears very suitable for laboratory tests but it is not at all appropriate for the horticulturist from the economic viewpoint as he would have to use hormone solutions of too high a concentration. As these solutions do not keep for any considerable time, this method would be too expensive

The solution method was used long before the dust method. As laboratory experiments have been made in different parts of the world since the practical application of growth inducing substances in horticulture were known, ample data on the use of this method for the rooting of cuttings are available. Even a Plant Hormone Committee was established at Kew (England) for the purpose of assembling and collecting all information published on the subject and to draw up a regular list of the plants with which practical results have been obtained. On the other hand, technical communications on the research work and experiments made have already been published, among which mention may be made of those by AMLONG and NAUNDORF (1), PEARSE (20), VAN DER LEK (36).

These publications naturally give the optimum dosage of phytohormone to be used to obtain the best result. All these data, however, only regard the treatment of cuttings with solutions of growth substances.

As stated earlier on, the dust method of GRACE has been improved and, in view of its technical and practical advantages, will probably soon be the only method employed in commercial horticultural establishments for the treatment of cutting with growth promoting substances. In the United States several firms have already placed these hormone dusts on the market

For the preparation of these dusts either industrially or in the laboratory, naturally the percentage of growth substance by weight is given. Now it is a question of comparing the efficacy of such a mixture of dry powders with that of a hormone solution; in other word, what proportion of phytohormone in a mixture of powders corresponds to a given concentration of a phytohormone solution.

This question may also be important from the theoretical viewpoint but is still more so from the practical standpoint. As regards the use of hormone solutions, the greater part of the results obtained up to the present relate to the concentration employed, indicated in mg. per litre, and it is a question of determining how to convert these values into corresponding values in the powder preparations.

An article of Hitchcock and Zimmerman, published while I was writing this study, also attacks this question and gives, in table form, the results of a series of experiments on the subject. However, no exact indication is given of the optimum dosage of growth substance for the plants tested, but only approximative values as, for example, 4 ‰ to 2 %. Such a wide margin would have disastrous effects for the horticulturist wanting to use hormone dusts as, by employing too high a dosage, he would stand to lose rather than gain.

## II. — Material and method employed

I took cuttings from a large number of different plants and divided them into series of 25 each. I then treated half of the cuttings with hormone solutions basing myself on the experience acquired in the course of my research work and employing concentrations round about those recognized as optimum. The cuttings in question were generally left for 16 to 18 hours in the solution; the solution was prepared freshly each time using distilled water.

The dust method was used for the other half of the cuttings. As excipient, contrary to the original method of Grace (7), I employed finely powdered wood charcoal. My reasons for choosing this substance have already been given in an earlier work (26) in which a description is also given of the process followed in preparing the relatively small quantity of growth substance and thorough mixing with the charcoal powder. Having no basis to determine in each case, the optimum percentage of the growth substance, I had to observe a wide margin in the proportions chosen, which thus varied between 0.25 ‰ and 4 %.

As growth substance I used in the first place β-indoleacetic acid. When I had a sufficient number of cuttings of the same sort of plant, I also tried β-indolebutyric acid and in two instances I also used α-naphthalene-acetic acid.

Before emerging the basal ends of the cuttings in the hormone dust I moistened them with tap water so as to render the dust more adherent.

Each experiment comprised two control series, one for tests with hormone solutions and the other with hormone dusts. The cuttings of the first series were left for 16 to 18 hours in distilled water while those of the second were dipped in finely powdered charcoal

After treatment the cuttings were planted in a double-sashed propagating frame, using river-bed sand for most of the species and a mixture of 3 parts sand and 1 part peat for the species of the genera *Ligustrum*, *Osmanthus* and *Chrysanthemum*. The mean temperature of the soil varied between 20 and 25°C.

At the end of the experiments the following were determined:

(1) number of rooted cuttings;

(2) number of roots developed on each;

(3) general aspect of the roots, in particular their insertion at the base of the cuttings.

These values served to calculate:

(*a*) percentage of rooting (%R);

(*b*) average number of roots per rooted cutting (A. R. C.);

(*c*) total number of roots per 100 rooted cuttings (T. N. R.).

These three values were subsequently combined in table form (see Table III). The value defined under (c) served to facilitate comparison between the different series of experiments. In fact, as shown in different tables, when the proportion of growth substance is too high, the rooting percentage decreases, while the average number of roots per rooted cuttings increases appreciably, so that, taking it as a measure of comparison, erroneous conclusions could easily be drawn· The total number of roots per 100 cuttings planted comprises both the percentage of rooting and the average number of roots and consequently is much more suitable as a means of comparison.

## III. – Discussion of results

As seen from the tables given further on, in nearly every case, the wet method (use of solutions) always gave better results than the dry method (use of dusts). This fact regards more the values obtained for the average number of roots per rooted cutting than the percentages of rooting.

I consider it superfluous to go into greater detail, the tables themselves being sufficient explanation. They are published not only by way of documentation but also as a means of indicating to horticulturists interested in the question, the optimum proportion and the injurious proportion of growth substance for each type of plant tested and with each method.

If an attempt is made to establish a comparison between the different data of the tables and, in particular to bring to a common denominator the results obtained with the wet method and those by the dry method, that is, to indicate in mg. per litre of water the equivalent of a given proportion of growth substance in a mixed powder so as to render this value applicable to all the kinds of plants tried, one is forced to recognize the impossibility of such an operation.

This impossibility is explained by an extreme example chosen designedly. The data regarding *Chrysanthemum indicum* var. Majesty (see Table I) indicate that 1 per cent. auxin in a powder corresponds to 150 mg. of auxin per litre in solution. On the other hand, the data on *Osmanthus aquifolium* (see Table I) show that a powder containing 3 per cent. growth substance corresponds more or less to a solution containing 10 mg. growth substance per litre. Consequently, if desired to bring the whole to a common denominator, to 3 per cent. auxin in powder would correspond, in the first case, 450 mg. auxin per litre of solution and, in the second case, only to 10 mg. per litre.

In endeavouring to obtain a certain regularity in the different data assembled, so as to explain such a difference in the values atteined, I arrived at the following results:

By means of diagrams based on the tables given further on in the article (but which for technical reasons could not be printed here), I attempted to find, for each kind of plant experimented on, the proportion of growth substance in a solution the effect of which corresponds to that of the proportion of auxin in a powder. In several cases, this relation could be seen directly on the diagram; when this was not possible, I tried by means of interpolation.

I can quite well imagine that my method may be exact mathematically but with difficulty tenable from the biological standpoint. For want of a better method, however, I believe that the facts ascertained experimentally and generally confirmed may be expressed mathematically in this way.

TABLE I. — *Dosages of growth substance, in powder and in solution, having the same efficacy.*

(Growth substance amployed β-indoleacetic acid)

| Numbered as in Table III | Plant employed | *A* Percentage of auxin in the dusts | *B* Corresponding concentrations of auxin solutions in mg per litre | *C* Concentrations of auxin solutions equivalent to 3 % auxin dusts |
|---|---|---|---|---|
| 1 | *Berberis thunbergii* | 1 % | 50 mg/l | 150 |
| 2 | *Chloranthus inconspicuus* | 0 5 | 50 | 300 |
| 3 | *Chrysanthemum indicum* var 'Blanche Poitevine' | 1 | 160 | 480 |
| 4 | *Chrysanthemum indicum* var 'Majesty' | 1 | 150 | 450 |
| 5 | *Dodonaea angustifolia* | 1 | 75 | 225 |
| 6 | *Euonymus japonicus* var *microphyllus* | 0 5 | 15 | 90 |
| 7 | *Ilex fortunei* | 3 | 25 | 25 |
| 8 | *Ligustrum ovalifolium* | 1 | 50 | 150 |
| 9 | *Osmanthus aquifolium* | 3 | 10 | 10 |
| 10 | *Piper geniculatum* | 1 5 | 80 | 160 |
| 11 | *Rosmarinus* sp | 3 | 50 | 50 |
| 12 | *Skimmia oblata* | 2 | 90 | 135 |
| 13 | *Viburnum tinus* | 1 | 50 | 150 |

In Table I, the figures in column *A* indicate, for each kind of cutting treated the percentage of growth substance (β-indoleacetic acid) in the powder employed, On the other hand, the figures in column *B* indicate in each case, the auxin content (concentration) of a solution having the same efficacy as the dust.

In order to compare the values thus obtained and which vary considerably as can be seen, I brought by calculation all the concentrations of the solutions to the equivalent of 3 per cent. auxin dust; these equivalents are given in column *C*.

In subjecting Table I to a critical examination, one is struck by the fact, already cited as example, that the equivalents calculated (column *C*) vary between 10 for cuttings of *Osmanthus aquilifolium* and 480 for those of *Chrysanthemum indicum* var. 'Blanche Poitevine'. Here again therefore, there does not appear to be any regularity.

However, on arranging the plants tested not according to alphabetical order, but in decreasing order of the equivalents calculated, the series given in Table II is obtained.

In regard to the aspect of the plants, it may be noted that, in Table II, they follow more or less in increasing order of the hardness of the stems. Thus the chrysanthemums have the softest and most succulent stems; the lower the series descends the harder the stems down to the genera *Ilex* and *Osmanthus* the most woody.

The diameter of the stem also seems to have some importance, otherwise there is no explaining the fact that cuttings of *Piper geniculatum* which, like the chrysanthemum, has a fairly soft stem, have a fairly low equivalent in the series in Table II. The stem of this plant is very thin and also very smooth, while that of chrysanthemums is thick and very hairy and consequent the cuttings retain more auxin powder.

TABLE II *Plants arranged in decreasing order of equivalents calculated*

| Plants employed | Calculated equivalents |
|---|---|
| *Chrysanthemum indicum* var 'Blanche Poitevine' | 480 |
| *Chrysanthemum indicum* var 'Majesty' | 450 |
| *Chloranthus inconspicuus* | 300 |
| *Dodonaea angustifolia* | 225 |
| *Piper geniculatum* | 160 |
| *Viburnum tinus* | 150 |
| *Ligustrum ovalifolium* | 150 |
| *Berberis thunbergii* | 150 |
| *Skimmia oblata* | 135 |
| *Euonymus japonicus* var *microphyllus* | 90 |
| *Rosmarinus* sp | 50 |
| *Ilex fortunei* | 25 |
| *Osmanthus aquifolium* | 10 |

That the surface of the base of the stems effectively plays some part is still more definitely seen in *Berberis thunbergii* plants. It is very difficult to get cuttings of these plants to root, and which are also very ligneous, and yet their equivalent is relatively high. This is explained by the fact that the stem is thick and furrowed longtitudinally, thus increasing the surface area. In the case I studied, this surface was increased still further by removing the spines at the base of the cuttings and by scarifying the base *.

The increase in the said surface augments considerably the quantity of the auxin powder which remains attached to the base of the cutting, a fact clearly shown by the relatively very low value of the optimum proportion of the growth substance in the powder in question.

The contrary is observed in cuttings of *Ilex fortunei* and *Osmanthus aquifolium*: the basal ends are very smooth and not so thick as is indicated by the very low values of the calculated equivalents.

Experiments with two other growth promoting substances (β-indolebutyric acid and α-naphthaleneacetic acid) led to similar conclusions.

* On the subject of the advantage of scarification of the ends of cuttings, see page 36 of the publication cited as No. 12 in the bibliographical list.

TABLE III. — *Results obtained with β-indoleacetic acid as growth substance*

ABREVIATIONS ADOPTED.

| | |
|---|---|
| % R . . . . . . . . . . . . . . | = Percentage of rooting |
| A. R. C. . . . . . . . . . . . . | — Average number of roots per rooted cutting |
| T. N. R. . . . . . . . . . . . | = Total number of roots per 100 rooted cuttings |
| * . . . . . . . . . . . . . . | - Non-basilar roots (excessive dosage of growth substance) |
| mg./l . . . . . . . . . . . . | — Concentrations of hormone solutions in milligrams per litre |

| | % R | A. R. C. | T. N. R. |
|---|---|---|---|
| **1. – *Berberis thunbergii* DC var. *atropurpurea* Hort** | | | |
| Solutions, mg./l | | | |
| 0 | 16 | 1.8 | 28 |
| 50 | 48 | 8.4 | 404 |
| 100 | 32 | 8.9 | 284 |
| 150 | 28 | 9.0 | 252 |
| 200 | 24 | 8.7 | 208 |
| Powders. | | | |
| 0 | 24 | 3.2 | 76 |
| 1 ‰ | 28 | 3.3 | 92 |
| 0.5 % | 40 | 4.9 | 196 |
| 1 % | 68 | 6.7 | 452 |
| 2 % | 68 | 6.8 | 464 |
| **2. – *Chloranthus inconspicuus* Sw** | | | |
| Solutions, mg./l | | | |
| 0 | 100 | 2.7 | 270 |
| 50 | 100 | 4.6 | 460 |
| 100 | 100 | 8.3 | 830 |
| 150 | 100 | 19.8 | 1980 |
| Powders. | | | |
| 0 | 100 | 2.9 | 290 |
| 0.5 ‰ | 100 | 4.3 | 430 |
| 1 ‰ | 100 | 4.0 | 400 |
| 0.25 % | 100 | 3.7 | 370 |
| 0.5 % | 100 | 4.2 | 420 |
| 1 % | 100 | 4.8 | 480 |
| 2 % | 100 | 5.3 | 530 |
| **3. – *Chrysanthemum indicum* Linn var. 'Blanche Poitevine'** | | | |
| Solutions, mg./l | | | |
| 0 | 80 | 6.1 | 490 |
| 100 | 60 | 7.5 | 450 |
| 150 | 60 | 6.7 | 400 |
| 200 | 70 | 14.0 | 980 |
| Powders: | | | |
| 0 | 80 | 4.5 | 360 |
| 1 ‰ | 110 | 5.4 | 540 |
| 1 % | 80 | 10.1 | 810 |
| **4. – *Chrysanthemum indicum* Linn var. 'Majesty'** | | | |
| Solutions, mg./l | | | |
| 0 | 80 | 8.2 | 560 |
| 50 | 80 | 16.0 | 1270 |
| 100 | 80 | 13.1 | 1050 |
| 150 | 80 | 18.0 | 1420 |
| 200 | 90 | 18.4 | 1660 |
| Powders | | | |
| 0 | 70 | 7.1 | 500 |
| 0.5 ‰ | 70 | 10.9 | 760 |
| 1 ‰ | 80 | 9.1 | 730 |
| 0.5 % | 100 | 12.2 | 1220 |
| 1 % | 90 | 15.9 | 1400 |
| **5. – *Dodonaea angustifolia* Blanco** | | | |
| Solutions, mg./l | | | |
| 0 | 55 | 4.1 | 225 |
| 25 | 65 | 6.2 | 405 |
| 50 | 85 | 4.7 | 400 |
| 100 | 60 | 14.3 | 1000 |
| 150 * | 55 | 5.7 | 315 |
| 200 * | 10 | 4.0 | 40 |
| Powders. | | | |
| 0 | 60 | 4.4 | 260 |
| 0.5 ‰ | 95 | 4.2 | 395 |
| 1 ‰ | 85 | 4.5 | 385 |
| 0 % | 85 | 4.5 | 490 |
| 1 % | 95 | 6.6 | 630 |
| 2 % | 95 | 8.9 | 850 |
| **6. – *Euonymus japonicus* Linn. f. var. *microphyllus*.** | | | |
| Solutions, mg./l | | | |
| 0 | 60 | 4.8 | 285 |
| 50 | 100 | 10.7 | 1065 |
| 100 | 100 | 12.4 | 1240 |
| 150 | 100 | 13.2 | 1320 |
| Powders: | | | |
| 0 | 60 | 4.8 | 285 |
| 0.5 ‰ | 65 | 5.0 | 325 |
| 1 ‰ | 85 | 6.4 | 540 |
| 0.5 % | 95 | 6.6 | 630 |
| 1 % | 100 | 7.9 | 790 |
| 2 % | 100 | 9.2 | 920 |

TABLE III (*continued*).

7. – *Ilex fortunei* Lindl.

| | % R | A.R.C. | T.N.R. |
|---|---|---|---|
| Solutions, mg./l.: | | | |
| 0 | 20 | 1.2 | 24 |
| 25 | 60 | 2.3 | 136 |
| 50 | 76 | 2.6 | 196 |
| 100 | 100 | 4.0 | 396 |
| 150 | 100 | 5.2 | 520 |
| Powders: | | | |
| 0 | 20 | 1.2 | 24 |
| 3 % | 52 | 2.9 | 148 |
| 4 % | 64 | 3.8 | 248 |

8. – *Ligustrum ovalifolium* Hassk. var. *aureomarginatum* Hort.

| | % R | A.R.C. | T.N.R. |
|---|---|---|---|
| Solutions, mg./l.: | | | |
| 0 | 80 | 2.5 | 200 |
| 10 | 92 | 3.5 | 320 |
| 25 | 100 | 3.6 | 364 |
| 50 | 100 | 5.4 | 542 |
| 100 | 100 | 11.0 | 1108 |
| 150 * | 88 | 8.7 | 764 |
| 200 * | 76 | 11.6 | 884 |
| Powders: | | | |
| 0 | 60 | 3.3 | 196 |
| 0.25 ‰ | 64 | 2.6 | 168 |
| 0.5 ‰ | 76 | 3.1 | 232 |
| 1 ‰ | 88 | 4.0 | 352 |
| 0.25 % | 80 | 3.6 | 284 |
| 0.5 % | 80 | 4.0 | 320 |
| 1 % | 100 | 5.6 | 560 |
| 1.5 % | 92 | 5.0 | 464 |
| 2 % | 92 | 4.4 | 404 |
| 3 % | 96 | 15.8 | 1376 |

9. – *Osmanthus aquifolium* Siebold.

| | % R | A.R.C. | T.N.R. |
|---|---|---|---|
| Solutions, mg./l.: | | | |
| 0 | 12 | 1.6 | 20 |
| 10 | 76 | 3.2 | 240 |
| 25 | 96 | 4.7 | 448 |
| 50 | 100 | 8.5 | 844 |
| 100 | 84 | 10.2 | 856 |
| 150 | 80 | 11.7 | 936 |
| Powders: | | | |
| 1 | 12 | 1.0 | 12 |
| 0.5 % | 32 | 2.0 | 64 |
| 1 % | 40 | 2.0 | 80 |
| 1.5 % | 52 | 1.6 | 84 |
| 2 % | 56 | 2.7 | 142 |
| 3 % | 60 | 4.3 | 260 |

10. – *Piper geniculatum* Sw.

| | % R | A.R.C. | T.N.R. |
|---|---|---|---|
| Solutions, mg./l.: | | | |
| 0 | 75 | 5.5 | 410 |
| 25 | 75 | 5.3 | 395 |
| 50 | 85 | 9.0 | 755 |
| 100 | 95 | 11.6 | 1105 |
| 150 | 95 | 19.1 | 1820 |
| 200 | 95 | 24.2 | 2295 |
| Powders: | | | |
| 0 | 85 | 6.2 | 525 |
| 0.5 ‰ | 95 | 6.6 | 630 |
| 1 ‰ | 95 | 7.0 | 670 |
| 0.25 % | 95 | 7.1 | 675 |
| 0.5 % | 100 | 6.7 | 670 |
| 1 % | 100 | 8.2 | 820 |
| 1.5 % | 100 | 9.6 | 960 |
| 2 % | 100 | 9.2 | 920 |

11. – *Rosmarinus* sp.

| | % R | A.R.C. | T.N.R. |
|---|---|---|---|
| Solutions, mg./l.: | | | |
| 0 | 70 | 3.0 | 205 |
| 25 | 100 | 15.5 | 1550 |
| 50 | 100 | 29.4 | 2935 |
| 100 | 90 | 40.3 | 3630 |
| 150 * | 80 | 30.5 | 2435 |
| 200 * | 80 | 27.6 | 2210 |
| Powders: | | | |
| 0 | 75 | 3.1 | 230 |
| 0.5 % | 80 | 3.5 | 265 |
| 1 % | 100 | 3.6 | 360 |
| 2 % | 100 | 4.6 | 460 |
| 3 % * | 100 | 30.3 | 3030 |
| 4 % | 100 | 40.7 | 4065 |

12. – *Skimmia oblata* Moore.

| | % R | A.R.C. | T.N.R. |
|---|---|---|---|
| Solutions, mg./l.: | | | |
| 0 | 95 | 5.0 | 480 |
| 50 | 100 | 11.1 | 1110 |
| 100 | 100 | 16.1 | 1610 |
| 150 | 100 | 25.6 | 2560 |
| Powders: | | | |
| 0 | 95 | 5.4 | 520 |
| 0.5 ‰ | 100 | 5.7 | 570 |
| 1 ‰ | 100 | 7.0 | 750 |
| 0.5 % | 100 | 7.5 | 750 |
| 1 % | 100 | 9.8 | 980 |
| 2 % | 100 | 15.0 | 1495 |

TABLE III (*concluded*).

| | % R | A.R.C | T N R |
|---|---|---|---|
| 13 - *Viburnum tinus* Linn | | | |
| Solutions, mg /l · | | | |
| 0 | 85 | 7 2 | 610 |
| 50 | 100 | 11 5 | 1150 |
| 100 | 100 | 12.3 | 1230 |
| 150 * | 90 | 13 1 | 1180 |
| Powders | | | |
| 0 | 70 | 8 6 | 600 |
| 0,5 ‰ | 70 | 8 6 | 600 |
| 1 ‰ | 90 | 10 1 | 905 |
| 1 % | 95 | 12 1 | 1150 |
| 2 % | 100 | 13 0 | 1300 |

## IV. — Conclusions

In summing up the results of the experiments described above, it is noted that in every case studied, the wet method (use of solutions) gave better results than the dry method (use of dusts).

The second method, however has considerable advantages for the horticulturist as it takes less time than the first and does not necessitate the preparation of auxin solutions in certain concentrations, difficult in practical horticulture. For this reason, the dry method, therefore, may be warmly recommended. In many cases also, it cannot but be used, especially for cuttings of plants which do not support a more or less prolonged contact with aqueous solutions, as, for example, *Azalea indica*, *Ficus elastica*, *Araucaria excelsa*, etc.

In horticultural establishments, however, where fairly accurately dosed growth promoting solutions can be prepared fresh on each occasion, naturally preference should rather be given to the wet method as long as it is a question of cuttings which can stand a more or less long treatment in aqueous solutions. In applying this method, not only can excellent results be expected, but the same solution can be used several times in sequence.

In this respect, the state of the base of the cutting plays a part of primary importance. In fact, the thicker, softer and more wrinkled the base, the greater the quantity of auxin powder which remains attached, so that, in this case, the proportion of growth substance in such a powder which is equivalent to the optimum concentration of an auxin solution will be less than for cuttings with a hard, thin and smooth base.

It follows that it is not possible to convert into auxin powder strengths the concentrations of the auxin solutions indicated in the international literature on the subject, but that, for each type of plant, it is necessary to carry out new experiments with growth promoting powders or dusts. In this repect, the experience acquired in practical experiments with auxin solutions in so far as regards: most

favourable season – type and conditions of cuttings to be selected – method of planting and upkeep, as well as other points, may naturally be utilized with considerable advantage and employed as a basis for further research work *.

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* For want of space, it has not been possible to publish the results furnished on the use of β-indolebutyric acid and α-naphtaleneacetic acid; these data, however, are conserved in the archives of the Bureau of Agricultural Information of the International Institute of Agriculture. (Editor's note)

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## STANDARDIZATION OF ITALIAN HORTICULTURAL PRODUCTS FOR EXPORT

*This article which was furnished by the National Fascist Institute for Foreign Trade, with headquarters at Rome, treats on the standardization of Italian horticultural products for export. It comes within the series dealing with this question (see this* Bulletin, *1940, No. 5 and 1941, No. 2*).

After the conclusion of the last world war, the Italian export trade in fruit products and truck crops maintained the upward trend already manifest during the pre-war period when it showed a tendency to fresh developments both from the geographical range and from the standpoint of variety and volume of the products. This trade became one of the most important and basic sources of the Italian commercial equilibrium.

This position and the increased competition on the European buying markets – chiefly as a result of the constant increase in merchandise from overseas countries – soon called the attention of the government authorities to the necessity of ensuring the valorization and protection of this trade.

The National Institute for Exports (now the National Fascist Institute for Export Trade), established in 1926, was commissioned with the organization and execution of this project. On June 23, 1927, on the proposal of this Institute, Law No. 1272 which created the 'national export trade-mark for fresh and dried fruits, citrus products and vegetable or truck crops' was promulgated.

It was thought that this trade-mark, which was accorded only to the best Italian exporting-houses, would facilitate the valorization of the products on foreign markets. With this system, however, serious disadvantages continued caused by uncontrolled consignments sent 'on commission', that is to say for sale to the highest bidder, being consignments of products of inferior quality dispatched by firms inadequately organized for this difficult trade

After the first Ministerial Decree (August 12, 1927) comprising the 'Special technical regulations regarding citrus exports' (elements of execution, modalities of control), came a new measure dated December 10, 1928 which extended obligation of control of quality before shipment of all consignments of citrus for export, independent of whether these products were stamped with the national trade-mark or not.

This extension of control led to an immediate improvement in the total trade output and was particularly well received by foreign importers In consequence, it was considered that it would be advisable to apply progressively a qualitative system of regulation for the principal horticultural products as regards exportation.

Thus in 1930 regulations were applied to the export of cauliflowers; in 1931 to potatoes, in 1932 to tomatoes, and in 1933 to peaches.

In 1937, the law regarding the 'national trade-mark' was modified with a view to giving it an objective character (that is to say, applied to controlled merchandise) and not subjective (that is to firms) so that all the decrees subsequently emitted for the purpose of regulating new products or of modifiying the previous system of regulation comprise the obligation of applying the national trade-mark to merchandise complying with export requirements. The object of this measure is to enable importers to distinguish 'standardized' products controlled at the time of shipment as regards quality from 'non-standardized' goods (products not yet subjected to any system of regulation).

Up to the present, the products subjected to a special qualitative regulation are the following:

| Product | First Decree applied | Decree in force |
|---|---|---|
| Citrus | M D of August 12, 1927 | M D of November 21, 1937 |
| Cauliflowers | » August 8, 1930 | » November 21, 1937 |
| Potatoes | » February 23, 1931 | » May, 7, 1940 |
| Tomatoes | » February 15, 1932 | » November 21, 1937 |
| Peaches | » March 14, 1933 | » June 25, 1940 |
| Plums | » May 31, 1937 | » June 25, 1940 |
| Grapes | » May 31, 1937 | » June 25, 1940 |
| Almonds | » July 31, 1938 | » July 31, 1938 |
| Salad vegetables | » December 26, 1938 | » October 30, 1940 |
| Chestnuts | » July 10, 1939 | » July 10, 1939 |

For other products such as pears, apricots, cherries, strawberries, French beans, green peas, spinach, proposals have been made based on the standardization principles adopted for regulated products.

The regulations issued up to the present, while taking into account the diverse nature of the products and their special characteristics, have a uniform technical structure solidly based on the following points:

Requisite qualities. The export product should be sound, clean, dry, of normal aspect according to variety, ripe in the trade sense, free from blemishes, extraneous matter and other defects injurious to good preservation, edibility and appearance '.

Denomination of quality grades. — While for truck crops only one trade quality has been established, for fruits and citrus there are generally two categories. For oranges and tangerines, there is a ' mixed ' category (with ' first ' and ' second ' grade fruits), and for summer crop lemons (' verdelli '), there is a third grade (commercial).

Grading to size. - Besides the exclusion for export of products inferior in size to the limits determined for each species, there are compulsory grades for size whenever products are dispatched packed in even layers. The number of categories varies from a minimum of 3 to a maximum of 6, according to the type of product.

Packing. -- In determining the types of packing, account was taken of the necessity of effecting a strict selection of ' types ' and sizes, endeavouring to reduce the number and to establish set types of packing so as to facilitate the usage of fixed price per pack rather than by unit weight and thus speed up and simplify the sale and distribution of the product on the market.

The principles considered in establishing characteristic types of standardized packing are the following:

sufficient solidity to guarantee protection of the product making allowance for transport difficulties, also maximum lightness so as to economize in material, transport and customs expenses;

form and aspect to enable a rational packing and presentation in keeping with the value of the product;

seize and shape facilitating handling, storage and transport;

cost in proportion to the value of the product.

The series of packings prescribed or advocated for horticultural products intended for export comprise: case, crates, casks and sacks (of gross weight from 20 to 50 kg.) for not very perishable goods; small crates, cases and wicker baskets (from 10 to 15 kg.) for perishable goods but not especially so; small boxes and baskets (from 2 to 6 kg.) for quickly perishable and fine quality goods.

Among the most generally used closed packs for export, mention may be made of the case with inner dimensions of 50 × 30 × 5-12 cm. used for packing fruits in 1 to 3 layers; the divided case measuring 63 × 32 × 27 cm. for packing lemons (4 to 6 layers); and the chestnutwood plaited baskets of 47 × × 32 × 26 cm. having a capacity of 25 to 30 kg. (chestnuts, potatoes, oranges).

Among the open packs: the case sized 53 × 39 × 9-12 cm. is the most generally adopted for products of average perishability; the crate with inner

measurements of 50 × 30 × 20 cm. for salad vegetables and cauliflowers; and the basket (with or without handle) of reinforced plaited wicker measuring inside 50 × 10 × 16 cm. used for packing cherries, plums, etc.

In view of present circumstances, much use is made of three-lined impermeable and perforated paper sacks instead of the usual jute bags.

The different outer markings are put on the top side. These include besides the name and address of the exporter and the national trade-mark, the species, variety and category of the quality and size of the product (when required)

Control. — The application of the regulations regarding grading is governed, as has already been stated, by the National Fascist Institute for Foreign Trade. Supervision is effected by inspectors placed in the different export zones (control centres). In order to facilitate administration the control centres are grouped into three Inspectorates situated one at Bologna (covering all Central and North Italy); another at Naples (covering Southern Italy with the exception of Calabria and Sicily) and the third at Messina (for Sicily and Calabria).

Grading control is carried out at the time of dispatch of the consignments to be exported. Inspection is then made of part of the goods ready to be loaded on the railroad trucks or on board ship. If the goods are passed, the inspector grants a pass certificate to the exporter. This certificate is added to the transport bills and on leaving Italy must be handed over to the customs authorities. If, on the other hand, the goods are not passed, they are blocked and the exporter is held responsible if there is found to be some serious defect or fraudulency; he may also be fined.

## *MISCELLANEOUS INFORMATION*

### Higher School of Agriculture at Wageningen (The Netherlands).

Professor G. MINDERHOUT has just published in collaboration with Professors J. A. SPRENGER, J. E. VAN DER STOCK and A. TE WECHEL as well as with the Bureau of the Netherlands Institute of Agricultural Engineers, an interesting study on the methods employed in this important branch of higher agricultural instruction.

Established in 1876 under the name of State School of Agriculture, this gradually developed into an institute of higher instruction. Since 1918, it is officially called the Higher School of Agriculture (*Landbouwhoogeschool*).

To enter the school, the candidates must have a secondary school leaving certificate.

Studies at the school comprise three divisions: the preliminary stage which lasts 16 months; the degree of two years and finally an ultimate period of at least a year for the examination of engineer. In beginning his studies the student must choose the special subject in which he is interested: Netherlands agriculture, colonial agriculture, horticulture, Netherlands forestry and colonial forestry. ' Netherlands agriculture ' and ' Colonial agriculture ' are each divided into several sections as will be seen.

Taking into account the compulsory probation period (with farmers, a State agricultural or horticultural Adviser or at experiment stations), the duration of the studies is from 5 to 6 years. On obtaining their degrees, the agricultural engineers may sustain a doctor's thesis.

PRELIMINARY PERIOD

This preparatory period consists in the introduction to agricultural science and comprises the general sciences the knowledge of which is indispensable to obtaining full benefit from the subsequent instruction During this period the students learn chemistry, physics, physical chemistry, mathematics, mineralogy, petrography, geology, hydraulics, anatomy, plant morphology and physiology, meteorology and climatology, applied mechanics and the basic principles of the knowledge of agricultural implements and lastly social economy

During the first year the students learn practically nothing of agriculture properly so called To obviate this drawback various professors give a certain number of lectures on agricultural science

NETHERLANDS AGRICULTURE

After the preparatory period the student has to choose which branch of study he desires to follow Whatever this branch, his knowledge of the general sciences must be increased and he may commence on subjects which a certain preliminary preparation This is the case, for example, for genetics and mathematical calculation of the results of observations The calculation of probabilities and mathematical statistics are optional, but noted on the diploma when the student has passed an examination in one of these optional branches. Courses in botany and in particular plant physiology are also followed during the first part of study The other subjects taught depend on the section chosen by the student These sections are four in numer, *viz* :

I Agriculture
II Animal husbandry
III Dairy industry
IV Rural economics

*Netherlands Agriculture*

Section 'Agriculture' — The chief subjects are botany and agricultural chemistry. Microbiology and soil improvement are also special branches as well as irrigation and drainage There are also agricultural mechanics, rural economics, animal husbandry, hygienics and domestic animal pathology, dairy industry

These latter branches naturally are not so detailed as for the students of sections more directly concerned

Section 'Animal husbandry' — The chief courses are those of the anatomy and physiology of domestic animals The students in this section naturally also follow the courses dealing with agriculture

Section 'Dairy industry' — The creation of a special section for this branch of study is justified by the importance of this industry in the Netherlands The chief course is dairy industry with practical work and then the courses on animal husbandry

Section 'Rural economics'. — This is the section which resembles most that of Agriculture, but having less practical laboratory work and a more detailed study of rural economics. Agricultural law, economic geography and social statistics are compulsory branches

In each section, besides the compulsory courses, there are optional courses of which special mention is made on the diploma if an examination is passed. The principal optional subjects are plant pathology, animal nutrition, agrology and colloid chemistry

The licentiate studies are followed by a compulsory probation period of six months, part of which may be carried out on a farm and the other with an agricultural Adviser, an animal husbandry Adviser, at an experiment station, a bureau of an agricultural organization, etc.

*Engineering*

The studies for the engineer examination comprise four branches. Two of these are compulsory in each section

Section 'Agriculture' Botany and agricultural chemistry

Section 'Animal husbandry' Animal husbandry and animal nutrition,

Section 'Dairy industry'. Dairy industry and microbiology,

Section 'Rural economics' Rural economics and agricultural law

A third branch must be chosen from a list of 17 subjects (the different subjects taught for licentiate studies and also plant improvement). The choice of the fourth branch is quite free

It is seen that this system makes a certain number of combinations possible. For example, a student of the Agriculture section may choose sugarcane cultivation and colonial rural economics as third and fourth branches if he intends later to go to the colonies

COLONIAL AGRICULTURE

Like his colleague in 'Netherlands Agriculture', the student in 'Colonial Agriculture' has first to increase his general knowledge; this part comprises botany (in particular plant physiology), genetics and the mathematical calculation of results of observations. Here also the calculation of probabilities and mathematical statistics are optional

*Colonial agriculture*

There are three sections, *viz*.

(1) tropical crops,
(2) animal husbandry in the colonies,
(3) colonial rural economics.

Section 'Tropical crops'. -- Besides agricultural botany and agricultural chemistry (especially knowledge of the soil and fertilizers) which are a supplement to the preparatory studies and are compulsory up to the end of studies in engineering, there are the following branches tropical rural economics, irrigation, microbiology, agricultural mechanics and sugarcane cultivation

Section 'Animal husbandry in the colonies'. -- In the main, the instruction is similar to that given in the Animal Husbandry section in 'Netherlands Agriculture' in as far as this branch of study directly concerns livestock. Besides animal husbandry, the anatomy and physiology of domestic animals, there are also tropical botany, agricultural chemistry, microbiology and colonial rural economics.

Section 'Colonial rural economics'. – The curriculum is similar to that of the 'Tropical Crops' section, but microbiology is not compulsory. Colonial rural economics is evidently the chief branch of study and the students must deepen their knowledge of Netherlands Indies law and Social statistics.

The students who will take up a position in the Netherlands Indies are advised to participate in the courses of the chief languages, the geography and etnography of the Netherlands Indies as well as those on tropical hygiene

A probation period of six months after the licentiate studies is compulsory for the three sections

*Studies for engineer in colonial agriculture*

As for ' Netherlands Agriculture ', the examination covers four branches of which the following are compulsory in each section

Section 'Tropical crops'. — Cultivation of tropical crops and agricultural chemistry

Section 'Animal husbandry'. — Animal husbandry and animal nutrition.

Section 'Colonial rural economics'. — Tropical rural economics, cultivation of tropical crops.

HORTICULTURE

*Licentiate's degree in horticulture*

The chief branch of study is naturally the cultivation of horticultural plants The compulsory branches are, in the first part, genetics, mathematical calculation of results of observation, botany (especially plant physiology), agricultural chemistry, systematics and geography of plants, plant pathology, microbiology and rural economics, in the second part, horticultural mechanics is substituted for rural economics As optional studies, in the first part there are soil improvement, agrology, colloid chemistry, calculation of probabilities, agricultural law and drawing The students who intend going to the Netherlands Indies study colonial rural economy and the agricultural law of the Netherlands Indies. The optional divisions of the second part are economic geography, garden architecture and the art of gardening, agrology, water management, horticultural technology, agricultural law, etc

The probation period is six months of which the first must be spent on the experiment fields of the laboratory for the cultivation of horticultural plants

*Studies for engineer in horticulture*

The student having acquired the bases of horticulture must now increase his knowledge in some special branch. Besides the principal subject—the cultivation of horticultural plants—the student must choose two others from a list of some ten branches and may also have free choice from all those taught at the School, but in choosing he must have the approval of the Rector Magnificus and the Assessors.

FORESTRY

There are two sections, one for Netherlands forestry and the other for tropical forestry. There is little difference between them and the students often follow the courses of the two sections at the same time. For the degree in forestry, plant pathology, agricultural chemistry and the cultivation of agricultural plants are compulsory, while in colonial forestry, knowledge of the land to be afforested, road construction and hydraulics are the subjects prescribed.

*Licentiate studies in Forestry*

During this part--introduction to the study of forestry properly so called the student has to learn that which regards the cultivation of trees and plants, wood, forest land, forest exploitation and its technique, forest management and protection, dendrometry and forest economy. The most varied knowledge has to be acquired and chiefly refers to plant anatomy and physiology, forest agrology and soil microbiology, mathematical calculation of results, land-surveying and levelling It is superfluous to point out the importance given to the courses on forestry exploitation, regulation of wood exploitation and forest economy

*Engineer in forestry*

The students have to pass an examination in six branches of study instead of the four for the other divisions For Netherlands forestry there are two compulsory subjects· the cultivation and production of wood and forestr economy. For the colonial section, forest exploitation regulation is added.

While preparing for his degree, the student must go through a probation period of 6 to 8 months, if possible abroad and take an active part during this period in the working of a large forest concern or some similar establishment

SCIENTIFIC RESEARCH AT WAGENINGEN

The Wageningen School disposes, for scientific research, of 22 laboratories, the greater part of which being created or reorganized after 1918. There are also four instituted attached to the School, *viz.*: Institute for agricultural implements and buildings, Institute for forestry research, Institute for the improvement of field crops and the Institute of Phytopathology. Besides the professors and assistant lecturers, the number of persons having a scientific education, occupied in the different laboratories and institutes, amounts to about 60.

The experiment fields for agronomic research cover a total surface area of 53 hectares

The library of the School contains some 160,000 volumes and receives approximately 2000 periodicals a year.

We have discussed in considerable detail the organization of the Wageningen School but consider the importance of the School justified in view of the success obtained in agricultural activities both in the Netherlands and in the Netherlands Indies

A H

## Bounties granted in Germany for the surrender of criptorchid boars

The disadvantages of keeping cryptorchid boars in a breeding herd are well known The animals of a certain age which show this constitutional anomaly are vicious, check fattening owing to their sexual excitability and, in about 90 per cent of the cryptorchid boars slaughtered, the value of the meat is reduced because of the odour *sui generis* peculiar to the sex.

With a view to eliminating cryptorchid boars from the porcine stock of Germany, the Reich Minister for Food Supplies and Agriculture has taken measures which provide for the allocation of bounties to the proprietors of such boars. For young pigs weighing up to 25 kg. a boumty of 50 Reichsmark; the only condition imposed is that these animals are slaughtered before attaining sexual maturity They should be consigned alive to any slaughter-house in Germany, which will pay the amount established as soon as the veterinary surgeon has verified the presence of cryptorchism I. M.

## Creation of an organization for meat economy in Germany

On March 11, 1941 the Reich Minister for Food Supplies and Agriculture published the provisory Statutes of this organization, situated at Berlin, which will comprise two Divisions I Meat production II Meat utilization.

Division I will comprise three Institutions covering respectively the following branches (1) Livestock and slaughtering (2) Machinery - (3) Construction work.

In Division II, five Institutions will deal with the following branches. (1) Cold storage of meat (2) Dressing of meat - (3) Histology and bacteriology -- (4) Physics and chemistry -- (5) Physiology

The bases of this organization give an idea of the extent of the work involved which covers not only knowledge which concerns the manager of a slaughterhouse, the engineer, the architect, the cold storage technician, the butcher and the cook but also the research work in bacteriology, of the doctor the chemist and especially the physiologist

I. M

# BOOK NOTICES *

AMERICAN SOCIETY OF AGRONOMY AND THE NATIONAL FERTILER ASSOCIATION *Hunger signs in crops* Washington, D C, 1941, 340 pages, 79 coloured plates, 95 half-tone illustrations. Price $ 2.50

In 1936, the American Society of Agronomy felt that though there is much yet to be discovered, enough was known about the symptoms of malnutrition in plants to prepare a monograph on the subject, and that such a monograph would fill a growing need The Committee on Fertilizers, headed by R. M. SALTER, appointed a subcom mittee under the chairmanship of J. E MCMURTREY, with a view to studying possi bilities As a first step, this group obtained the assistance of the Plantfood Research Committee of the National Fertilizer Association in rounding up all available coloured photographs of malnutrition symptoms, and these were exhibited at the 1936 meeting of the Society of Agronomy.

In 1937, plans were outlined for the book and the authors were selected, To prevent the price being prohibitive, the authors as members of The American Society of Agronomy contributed their work without compensation, Charles J. BRAND and H. R SMALLEY contributed much time and effort which ordinarily would have constituted part of overhead expenses, also The National Fertilizer Association, through its Soil Improvement Committee agreed to be responsible for the sale of enough copies, in addition to the ordinary demand, to make a fairly large printing possible and thus materially reduce the cost per copy.

The result of these collective efforts is indeed worthy of attention for its text, numerous illustrations in colour and halftone and its luxurious get up.

Besides the preface by Gove HAMBIDGE, the work comprises the following nine chapters

I Why do plants starve ? George D. SCARSETH and Robert M. SALTER. - II. Plant-nutrient deficiency in tobacco. J. E. MCMURTREY, Jr. III. Deficiency symptoms of corn and grains. George N. HOFFER. - IV. Plant-nutrient deficiency symptoms in the potato. H. A. JONES and B. E. BROWN. — V. Plant-nutrient deficiency symptoms in cotton. H. P. COOPER VI. Plant-nutrient deficiencies in vegetable or truck-crop plants. J. J. SKINNER. - VII Nutrient-deficiency symptoms in deciduous fruits. O. W. DAVIDSON. VIII. Plant-nutrient deficiency symptoms in legumes. E. E. DETURK. IX. Symptoms of citrus malnutrition. A. F CAMP, H. D CHAPMAN, George M. BAHRT, E. R. PARKER.

* Reviews of books presented to the Library appear under this heading.

We will not examine in detail the contents of these different chapters and will limit ourselves to the questions treated in the chapter on the potato JONES and BROWN successively explain the symptoms of deficiency in nitrogen phosphorus, potash, magnesium, calcium, boron, manganese, sulphur, iron, copper and zinc, when more than one element is deficient. A key to plant-nutrient deficiency symptoms is given and finally a list of the literature cited.

Each chapter is arranged on more or less the same lines.

What these few indications do not point out, however, is the conciseness of the various accounts written in simple language without superfluous details, understandable to everyone. It is the incredible amount of information, research and experimentation work condensed in these short studies and enriched by abundant photographic material in colour and halftone, which makes this a remarkable work which will be as useful in the hands of the progressive farmer, as in the office of the agronomist, the fertilizer specialist, the county agent, the vocational agricultural teacher and even the scientist The work does honour not only to the authors but also to those who contributed towards its publication and in particular to the American Society of Agronomy and the National Fertilizer Association

A H

INTERNATIONAL WINE OFFICE, *Lexique viti-vinicole international* French, Italian, Spanish, German. Published under the superintendence of A FAES, Lausanne, F Rouge & Cie., 1940, 278 pp

This work is the subsequence of the proposal made by Dr H FAES with a view to the preparation and publication through the International Wine Office of a glossary on wine-growing

It is the work of a special Committee under the chairmanship of Dr H FAES, Director of the Viticultural Experiment Station at Lausanne the Committee being composed of French, Italian, Spanish and German delegates

The glossary is intended principally for wine-growers desirous of knowing the proper meaning of the technical expressions employed in wine-growing countries other than their own. It marks a new advance in viticulture and should be of particular use in specifying the meaning of the technical words employed in the different countries so as to prevent errors in interpretation Each term in the four languages is followed by a short definition and the equivalent of the term in the other three languages The words are arranged (in each language) in one alphabetical order and not in alphabetical order under different chapters.

This first edition is considered by the authors as an experiment Translation of the same words into other languages is already anticipated Other terms regarding wine-growing legislation, customs duties and commercial expressions will be included in future editions. Even in its present form it will be of considerable value to everyone who wishes to keep up to date with the progress made in wine-growing in other countries.

A H

RÜDIGER, Max, *Der landwirtschaftliche Brennereibetrieb*. 5th Edition revised) Stuttgart, Editor Enke, 1941, XII 230 pp. Price 9 RM

The fact that the treatise on Distilling (agricultural products) of RUDIGER has already reached the 5th edition is a sure indication of the value of this work. At the present stage of technical progress and reorganization, however, there would have been the fear that it was somewhat out of date if the author had not decided to revise completely and in part to modify the text. In its new form this book constitutes a true treatise which, in an interesting manner, covers all theoretical and practical knowledge regarding the distillery business. Particular mention should be made of the chapters on yeasts and vinasses, important both for the majority of agriculturists who are only indirectly interested in distillery and for the purchasers of the residual products. Of up to date importance and of interest to numerous readers is the extensive chapter on small scale and fruit distillery A hundred illustrations and diagrams effectively show the multiform apparatuses employed in the distillery business as also the analytical study of the raw materials used and products obtained.

N v. G

# NEW PERIODICALS RECEIVED BY THE LIBRARY OF THE INTERNATIONAL INSTITUTE OF AGRICULTURE

## for the fourth quarter of 1941 (*).

ARGENTINA. División estaciones experimentales. Servicio de fitoecologia. Boletin mensual del Servicio de fitoecologia. Buenos Aires, v. 3 (1937)–, mens. [v 3 (1937)– v. 4 (Mars 1938) under the title: « Sinopsis de las observaciones realizadas durante el mes... »]

ARGENTINA. Junta nacional de carnes Publicación. [Buenos Aires], nº 4 (1936)–, irr.

BRAGANTIA; boletim técnico do Instituto agronômico do Estado de São Paulo. Campinas, v. 1 (1941)–, mens. 50$000. [continues: « Campinas. Instituto agronômico. Boletim técnico »].

BUREAU international d'éducation. Bulletin du Bureau international d'éducation. Genève. v. 5 (1931)–, trim 5. – frs. [Bibliographical part (II) published also as reprint under the title: « Service bibliographique »].

CAMPINAS. Instituto agronômico. Boletim, Campinas, nº 3 (1937)–, irr. (Secretaria da agricultura, industria e comercio do Estado de São Paulo).

CAMPINAS. Instituto agronômico. Circular. Campinas, nº 2 (1937)–, irr. (Secretaria da agricultura, industria e comercio do Estado di São Paulo).

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DIVULGACIONES agropecuarias Ministero de fomento. Direccion de agricultura y ganaderia. Lima, nº 1 (1933)–, irr.

ESPAÑA. Instituto nacional de investigaciones agronómicas. Centro de cerealicultura. Hoja divulgadora. Madrid, nº 10 (1939)–, irr.

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LANDMASCHINEN-Kaufmann. Mitteilungen für den Landmaschinenfachhändler und seine Instandsetzungswerkstatt, verbunden mit dem zweimal wöchentlich erscheinenden « Eildienst ». Organ der Fachabteilungen Landmaschinen in der Wirtschaftsgruppe Einzelhandel u. des Reichsverbandes des Landmaschinenhandels E. V. Berlin, v. 32 (1941)–, bimens. RM. 10.– [Formerly: « Mitteilungen des Reichsverbandes des Landmaschinenhandels »].

NEDERLAND. Directie van den landbouw. Landbouwvoorlichtingsdienst Mededeeling. Wageningen, H. Veenman & Zonen, nº 2 (1934)–, irr. (Ministerie van landbouw en visscherij).

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REVUE pour l'étude des calamités. Bulletin de l'Union internationale de secours. Genève, v. 1 (1938)–, bimestr. 10. – frs. s. [Text in various languages]. [Continues: « Matériaux pour l'étude des calamités »].

SÃO PAULO (Etat). Departamento de fomento da producção vegetal. Secção de fructicultura. Circular. São Paulo, Secretaria da agricultura, industria e commercio do Estado de S. Paulo. nº 1(1936)–, irr. [Mimeographed.].

SAPERE; quindicinale illustrato di divulgazione delle scienze, della tecnica, delle arti e della cultura generale. Milano, U. Hoepli, v. 12 (1940)–, bimens. L. 50. – int.; L. 70. – étr.

SCIENCE new letter; the weekly summary of current science. Washington, Science service, v. 35 (1939)–, hebd. $ 5. –

(*) *List of abbreviations:* bihebd (biweekly); bimens. (twice monthly); bimestr. (every two months) déc. (every ten days); étr. (foreign price); fasc. (copy); hebd. (weekly); int. (home price); irr. (irregular) mens. (monthly); nº. (number); N. S. (new series); p. a. (per annum); q (daily); sem. (half yearly); s. (series); trihebd. (every three weeks); v. (volume); trim. (quarterly).

N. B. — Between brackets [/] are given translations and explanatory notes not appearing in the title of the review.

Prof. UGO PAPI, *Segretario generale dell'Istituto, Direttore responsabile.*

PRINTING OFFICE CARLO COLOMBO — ROME, DECEMBER, 15, 1941.

# PLANT PROTECTION

# INTERNATIONAL BULLETIN OF PLANT PROTECTION

## *DISCOVERIES AND CURRENT EVENTS* *

**ARGENTINE REPUBLIC.**

### Tulip Fire (*Botrytis tulipae*), a Disease New to the Country †

Mme Maria D. Campi of the Phytopathological Division of the Ministry of Agriculture has discovered that *Botrytis tulipae* (Lib.) Hopk. has made its appearance in the country for the first time.

The parasite was obtained in pure culture and utilized for the experimental reproduction of the disease it causes on the tulip. Typical lesions were produced on the leaves, stalks and bulbs. From the studies carried out, it was concluded that —

(*a*) When the soil is inoculated with the mycelium and the sclerotia of the fungus, the bulbs are attacked; resting spores formed in the bulbs enable the disease to be transmitted from one crop to another;

(*b*) The fungus attacks the aerial parts of the plant and under the right conditions of humidity, produces spores on the lesions, the eventual dispersion of these spores causes secondary infection which may determine the loss or depreciation of the flower.

The following general system of control is advocated —

(1) Disinfection of the soil and planting boxes;

(2) Disinfection of the bulbs after removing the old scales or those showing sclerotia;

(3) Maintain moisture conditions at the minimum necessary,

(4) Removal of the parts of plants or plants showing symptoms of the disease.

**BELGIUM.**

### Predators of the Colorado Beetle (*Leptinotarsa decemlineata*) §

During the month of July, 1940 in a small focus of *Leptinotarsa decemlineata* a larva of the stink bug *Picromerus bidens* L. was found feeding on a larva of the Colorado beetle. Subsequently, a fair number of adults of this

* Under this and the next heading the countries are arranged in French alphabetical order.

† Communication from the official correspondent of the Institute, Mr. JUAN B. MARCHIONATTO, Agricultural Engineer, Director of 'Sanidad Vegetal', Ministry of Agriculture, Buenos Aires, Argentine Republic.

§ Communication from the official correspondent of the Institute, Prof. R. MAYNÉ, Director of the State Station of Entomology, Gembloux, Belgium.

bug and also related species were collected with a view to studying their behaviour in relation to the Colorado beetle.

Attention was concentrated on *P. bidens* and *Troilus* (*Podisus*) *luridus* Faf. both belonging to the subfamily Asopinae.

Up to date, from the studies made, these two species appear to be the best aids in the biological control of the potato pest.

From laboratory experiments and observations in the field the following facts have been established: –

(1). *Picromerus bidens* L. lives in cool and moist surroundings where there is a dense growth of various plants; its localization appears to depend on the abondance of insects on which it feeds. It is carnivorous. It likes prey to have a smooth skin, be turgescent and slow-moving; the Colorado beetle larva may be considered as one of the forms most suited for its diet. Although this species hunts its food, relatively speaking, it does not cover a wide range. High temperature and humidity stimulate its activity. In Belgium, the eggs hibernate and hatch in spring, the adults appear during the first fortnight of August and die in the first cold days of autumn. Pairing takes place immediately after the change into imago.

(2) *Troilus* (*Podisus*) *luridus* Fab. feeds more or less like *P. bidens*. It prefers a moist atmosphere It is a insect less mobile than the above-mentioned species. The adults appear at the beginning of September and hibernate. Egg-laying takes place in spring.

Further studies will show the biological conditions and behaviour of the Asopinae in relation to the different prey attacked within their possible limits of dispersion. It will then be possible to determine the conomic value of each species and the practical means of their utilization in the biological control of the Colorado beetle.

**RUMANIA.**

## Downy Mildew of the Vine during 1940 *

The following observations refer to the Rumania existing before territorial changes.

Owing to the climatic conditions, the downy mildew of the vine (*Plasmopara viticola*) was very widespread last year, infection was extremely intensive, the extent of the damage being among the highest reported in Rumania.

The incessant rains of May and June prevented the majority of the winegrowers to sulphate in time, the consequence of this ommission being the total destruction of the grape harvest in numerous regions of the country. In 1940, the mildew appeared not only on the leaves and bunches but also on the tendrils and young shoots, stunting their growth. Consequently, the position regarding the production of the following season is also serious.

* Communication from the official correspondent of the Institute, Prof. Dr. TR. SĂVULESCU, Chief of the Phytopathological Section, Agricultural Research Institute of Rumania, Bucharest, Rumania.

The following tables show the exceptional meteorological conditions of the spring and beginning of summer in 1940 which facilitated the intensive invasion of the fungus.

Meteorological observations for April, 1940

| Province | Temperature | Precipitation | | |
|---|---|---|---|---|
| | Deviation from average normal for the month | Rainfall in mm. | Normal rainfall in mm | Difference in % |
| Maramuresh | −0 52° | 43 3 | 61 7 | 30 |
| Crişana | −0.33° | 35 4 | 59 8 | −48 |
| Banat | −0 17° | 46 0 | 63 8 | −28 |
| Transylvania | −0 56° | 39 0 | 54 3 | 28 |
| Lesser Wallachia | −0 02° | 59 1 | 54 0 | + 9 |
| Greater Wallachia | −0.53° | 64 1 | 48 0 | + 34 |
| Dobruja | 1 29° | 61 2 | 33 6 | + 82 |
| Moldavia | −1 56° | 65 5 | 45 2 | + 15 |
| Bukovina | 1 40° | 53 4 | 52 1 | + 2 |
| Bessarabia | −1 40° | 54 3 | 29 8 | + 82 |
| Average or total | −0 91° | 55 1 | 48 4 | . 14 |

Remarks The average temperatures fluctuated, with small variations, around normal, without exceeding or equalling, however, the normal figure in any province For the whole country, the average deviation from normal was 0 91° C

On the whole, rainfall was estimated at 6 7 mm. or 14 per cent higher than normal

Of special interest as regards wine-growing are the rainfall figures for the hilly regions

| Area | Effective rainfall in mm. | Normal rainfall of the region in mm |
|---|---|---|
| Someş-Tisa | 39 | 56 |
| Criş-Tisa | 33 | 64 |
| Mureş-Tisa* | 29 | 52 |
| Bega-Tisa | 30 | 70 |
| Timişul | 42 | 62 |
| Jiul | 76 | 59 |
| Oltul | 54 | 67 |
| Argeşul | 64 | 65 |
| Ialomiţa | 74 | 55 |
| Siretul | 68 | 46 |
| Pruntul | 62 | 42 |
| Dunărea | 64 | 50 |
| Nistrul | 65 | 32 |
| M. Neagră | 77 | 37 |
| Average | 56 | 50 |

* *Mon. 7-8 Ingl.*

Remarks With the exception of a few regions where rainfall was below normal, in the hill regions, an average increase of 6 mm. above normal was reported for April

## Meteorological observations for May, 1940

| Province | Temperature | Precipitation | | |
|---|---|---|---|---|
| | Deviation from average normal, for the month | Rainfall in mm | Normal rainfall in mm | Difference in % |
| Maramuresh | −2 57° | 124 8 | 90 3 | + 38 |
| Crişana | −2 60° | 116 2 | 77 6 | + 50 |
| Banat | −2 37° | 79 2 | 87 0 | + 9 |
| Transylvania | 2 64° | 91 8 | 81 0 | + 13 |
| Lesser Wallachia | 2 27° | 88 1 | 76 7 | + 15 |
| Greater Wallachia | −2 43° | 109 7 | 70 8 | + 51 |
| Dobruja | −2 29° | 72 7 | 44 9 | + 62 |
| Moldavia | 2 77° | 143 9 | 68 7 | + 109 |
| Bukovina | 2 75 | 148 3 | 97 5 | + 52 |
| Bessarabia | 3 58° | 92 6 | 46 9 | + 97 |
| Average or total | 2 58° | 106 0 | 71 1 | + 49 |

Remarks May was cold and wet Throughout the country, the average temperature was below normal for that month, the average deviation was -2 58 per cent, with extremes of −2 27° in Lesser Wallachia and −3 35° in Bessarabia

For the whole country, excepting the Banat region, the rainfall was 34 9 mm i e, 4 per cent higher than normal with extremes of 15 per cent in Lesser Wallachia and 109 per cent in Moldavia

## Hill region May 1940

| Area | Effective rainfall in mm | Normal rainfall of the region in mm |
|---|---|---|
| Someş-Tisa | 106 | 79 |
| Criş-Tisa | 121 | 84 |
| Mureş-Tisa | 86 | 77 |
| Bega-Tisa | 10 | 83 |
| Timişul | 71 | 80 |
| Jiul | 80 | 82 |
| Oltul | 106 | 89 |
| Argeşul | 95 | 95 |
| Jalomiţa | 82 | 86 |
| Siretul | 154 | 70 |
| Prutul | 113 | 60 |
| Dunărea | 82 | 70 |
| Nistrul | 74 | 59 |
| M Neagră | 59 | 51 |
| Average | 109 | 73 |

Remarks. The increase in rainfall varied between 6 mm. in the Black Sea basin and 84 mm. in the Siret basin. On an average, the increase was 36 mm above the normal figures for the month and the region.

## Meteorological observations for June, 1940.

| Province | Temperature | Precipitation | | |
|---|---|---|---|---|
| | Deviation from average normal for the month | Rainfall in mm. | Normal rainfall in mm | Difference in % |
| Maramuresh | −0.92° | 145 5 | 116 4 | + 25 |
| Crişana | −0.55° | 166.7 | 96 6 | + 67 |
| Banat | −0 80° | 168.7 | 97.7 | + 72 |
| Transylvania | −0.90° | 161 3 | 110.8 | + 45 |
| Lesser Wallachia | −0 65° | 254.7 | 80 7 | +214 |
| Greater Wallachia | −0 73° | 162 9 | 92 5 | + 75 |
| Dobruja | +0.10° | 68 1 | 59.7 | + 14 |
| Bukovina | −0.66° | 146.2 | 123 6 | + 18 |
| Moldavia | −0.66° | 146 4 | 83 8 | + 74 |
| Average or total | -- | 159 6 | 88 1 | + 81 |

Remarks. It was during this month that infection was greatest. Temperature was close to normal, though never exceeding normal, with the exception of Dobruja (+ 0.10°) Deviations varied between −0.55° in Crişana and −0.92° in Maramuresh. Precipitations were :cessively abundant, showing an increase of 71.5 mm., *i. e.*, above normal. The highest inease was reported in Lesser Wallachia, amounting to 214 per cent.

## Hill region. June, 1940.

| Area | Effective rainfall in mm. | Normal rainfall of the region in mm. |
|---|---|---|
| Someş-Tisa | 166 | 105 |
| Criş-Tisa | 156 | 107 |
| Mureş-Tisa | 156 | 102 |
| Bega-Tisa | 152 | 102 |
| Timişul | 141 | 95 |
| Jiul | 267 | 80 |
| Oltul | 217 | 98 |
| Argeşul | 144 | 111 |
| Ialomiţa | 174 | 109 |
| Siretul, | 159 | 86 |
| Prutul | 108 | 75 |
| Dunărea | 55 | 78 |
| M. Neagră | 88 | 66 |
| Average | 159 | 89 |

Remarks Subnormal rainfall only occurred in the Danube Basin. (−23 mm.). In the other regions, rainfall was above normal with increases varying between 22 mm. in the Black Sea Basin and 167 mm in the Jiul Basin, the average for the entire hill région being 70 mm

## Meteorological observations for July, 1940

| Province | Temperature: Deviation from average normal for the month | Precipitation: Rainfall in mm | Precipitation: Normal rainfall in mm | Precipitation: Difference in % |
|---|---|---|---|---|
| Maramuresh | −0 85° | 87 6 | 104 8 | −17 |
| Crişana | −1 43° | 67.1 | 78 2 | −14 |
| Banat | −0 87° | 49.8 | 75 6 | −34 |
| Transylvania | −0 30° | 63 2 | 99 1 | −36 |
| Lesser Wallachia | +0 40° | 45.8 | 58 3 | −21 |
| Grande Wallachia | −0 27° | 63.4 | 67 2 | − 6 |
| Dobruja | +0 60° | 46 3 | 51 5 | −10 |
| Bukovina | −0 23° | 53 1 | 67 8 | −22 |
| Moldavia | −0 23° | 100 6 | 116 5 | −14 |
| Average or total | −0 31° | 59 3 | 70 1 | 15 |

Remarks In Lesser Wallachia and Dobruja, the average temperatures were slightly higher than normal In the other provinces, they were below normal, deviations varying from 0.23° in Moldavia and Bukovina and —1 43° in Crişana For the whole country, the difference amounted to —0 31° below normal Rainfall was lower than normal in all the provinces of the country. For the whole country, the decrease was 10 8 mm. or 15 per cent. under normal, with deviations varying between 6 and 36 per cent

## Hill region. July, 1940.

| Area | Effective rainfall in mm | Normal rainfall of the region in mm |
|---|---|---|
| Someş-Tisa | 78 | 95 |
| Criş-Tisa | 87 | 87 |
| Mureş-Tisa | 46 | 93 |
| Bega-Tisa | 49 | 79 |
| Timişul | 37 | 70 |
| Jiul | 26 | 62 |
| Oltul | 59 | 74 |
| Argeşul | 61 | 81 |
| Ialomiţa | 56 | 74 |
| Siretul | 52 | 68 |
| Prutul | 62 | 65 |
| Dunărea | 38 | 58 |
| M Neagră | 97 | 60 |
| Average | 56 | 72 |

Remarks. Rainfall was higher than normal in the Black Sea Basin. In the other areas, there was a decrease varying between 3-5 mm in the Criş-Tisa and Prut Basins and 47 mm in the Mureş-Tisa Basin, with an average of 24 mm.

According to the information received from the different wine-growing regions, the development of the powdery mildew of the vine was as follows:

In the Drăgăşani wine-growing region, Vâlcea District, the first attack was observed on May 27, the second on June 4, the third on June 12, the fourth on June 20; the other attacks in June and July followed on so closely that it was impossible to distinguish each separately. The last attack of vine mildew in this region was reported as taking place on August 9. The losses suffered by the viticulturists in the Drăgăşani region caused by mildew attack alone amounted to 25 per cent. of the crop, while the small-scale growers, owing to lack of copper sulphate, lost up to 80 per cent. The varieties most heavily attacked and showing the greatest drop in production were: 'Perla de Csaba', 'Chasselas', 'Ottonel'; the varieties 'Crâmpoşia', 'Gordan', 'Cabernet', 'Pinot' and 'Riesling' showed greater resistance.

In the Istriţa region, Buzău District, up to August, nineteen attacks of mildew occurred. The first infection was observed between May 23 and 25. The most frequent and serious attacks took place between June 14 and 30 when eight periods of invasion followed and overlapped each other. The latter caused the most damage as they occurred at the flowering season of the vine. The seven invasions which followed at very brief intervals during the first half of July were also very serious. The most severe attack in this region took place after the hail storm of June 23, destroying 20-25 per cent. of the leaves and grapes.

In the plain where the Istriţa nursery is located, the losses due to mildew in 1940 attain 70-80 per cent., and in some cases, the crop was an entire loss. The varieties which showed the greatest susceptibility were: 'Perla de Csaba', 'Angévine Oberlin', 'Madeleine Angévine', 'Hamburg Muscatel', 'Afuz-Afi', 'Tămâioasă românească', 'Chasselas doré', 'Chasselas Napoléon', 'Băbeasca' and 'Grasa'; the varieties 'Aligoté', 'Pinot', 'Cabernet', 'Fetească', 'Gordan', 'Riesling', 'Crâmpoşia' and 'Băsicata' showed greater resistance.

In the Pietroasele region, Buzău District, 14 periods of infection were reported with certainty though most probably, there were more owing to the unusual climatic conditions of the year.

Certain periods of infestation overlapped and consequently, it was impossible to distinguish between them. Fourteen, however, were definitely identified. The first attack took place between May 17 and 18, although the disease did not make its appearance until May 29. The second attack occurred on May 23-24 and the disease was observed on June 9. The third invasion occurred on June 2-3 and the conidiophora appeared on June 13. The fourth attack happened on June 18 and was caused by the infection of June 5-6; the leaves were affected and also, for the first time, the bunches. The fifth attack, reported on June 26, was fairly severe, attacking both the leaves and the grapes. The sixth attack probably

took place on the night of June 20-21, following a heavy rain storm and its appearance was noted on June 30. The eighth attack, very severe, probably occurred on June 30, being observed on July 7. The intensity of the sixth, seventh and eight attacks was so severe that the crop of all untreated vineyards was entirely destroyed. The ninth period of infection appeared on July 6 and was observed on July 12 in the form of sterile oily spots The tenth attack, reported on July 15, was facilitated by a fall of rain on July 11; the eleventh attack (July 31) only affected the extremities of the young shoots and was observed on August 5. The twelfth attack was facilitated by the rain of August 18 and made its appearance on August 28, the thirteenth also benefited through the rainfall of August 18 and manifested itself on September 3.

The last three periods of infestation were of no practical importance, as only the tips of the shoots were affected by mildew; these were removed.

In the region where the experiment vineyard of Pietroasele is situated, the varieties showing the greatest susceptibility to mildew infection were 'Mustoasa', 'Chasselas', 'Braghina', 'Afuz-Ali', 'Crâmpoșia', 'Tămâioasă românească', 'Galbenă', 'Negru vârtos', 'Negru de Csaba', 'Coarna albă', 'Coarna neagră' and 'Grasa'. The varieties 'Fetească albă', 'Selection Carrière', 'Ottenol', 'Cabernet Sauvignon', 'Cinsaut', 'Pinot' and 'Riesling' were more resistant.

In the Prahova District at Valea Călugărească, according to observations made at the vineyard of the School of Viticulture, from May up to mid August, there were 38 attacks. Owing to the continual rains which prevented sulphating being carried out at the proper period, the entire crop was affected. As seen from the development of the vines during the growth period, the crop of the following season will probably be unsatisfactory. In general, in this region, losses amounted to 70-80 per cent. and even 100 per cent. In most cases, the damage caused was 90-100 per cent. In this region, the varieties most severely attacked were: 'Chasselas doré', 'Muscat-Ottenol', 'Perla de Csaba', 'Dattier de Beyrouth', 'Pinot', 'Aligoté', 'Traminer' and 'Fetească', while the varieties 'Riesling', 'Selection Carrière', 'Galbenă', 'Cabernet Sauvignon' and 'Cinsaut' showed better resistance.

In the Huși region of the Fălciu District, six successive and distinct attacks of mildew were reported. The losses suffered by the wine-growers amounted to about 80 per cent. of normal production. The varieties 'Perla de Csaba', 'Chasselas', 'Frâncusa' and 'Muscat-Ottenol' were the most severely attacked, while the varieties 'Fetească', 'Zghiară', 'Galbenă' and 'Riesling' were damaged to a lesser extent.

In the Odobești-Panciu region of the Putna District, 5 severe, distinct attacks of mildew as well as three intermediary invasions were reported. The total losses suffered by the wine-growers of this region attained 60 per cent. of the normal production. The most susceptible varieties were: 'Chasselas Rose', 'Chasselas doré', 'Chasselas Napoléon', 'Tămâioasă românească', 'Afuz-Ali', and 'Galbenă; the varieties 'Aligoté', 'Plavăie', 'Cabernet Sauvignon', 'Fetească albă and 'Traminer' proved to be less susceptible; the most resitant varieties were 'Sauvignon' and 'Crăcana',

In the Murfatlar region in Dobruja, four attacks attaining an intensity formerly unknown in this region were reported The losses were as much as 90 per cent. of the normal crop. The most severely attacked varieties were: 'Muscat-Ottenol', 'White Pinot', 'Perla de Csaba' and 'Madeleine Angévine', the varieties 'Italian Riesling', 'Trolinger', 'Grey Pinot', 'Malvoisie' and 'Hamburg Muscatel' suffered less damage

In the Târnava region in Transylvania, according to the observations made by the Mediaş School of Agriculture, there were 22 attacks, some more severe than others, between May 29 and August 1 Infection was severest during the flowering season; the damage reported amounted to 70 per cent. The varieties most severely attacked were 'Muscat-Ottenol', 'Red Sylvaner' and Green Sylvaner'. The varieties 'Fetească', 'Royal Fetească' and 'Italian Riesling' proved more resistant.

In the Dioseg-Bihor region, at least seven distinct attacks of an intensity previously unknown in this region, were reported. Losses amounted to over 60 per cent. of the normal crop. The varieties suffering the most damage were 'Muscat-Ottenol', 'Tămâioasă', 'Chasselas', 'Afuz-Ali', 'Muscat Maderat' and 'Perla de Csaba', while the varieties 'Riesling', 'Furmint', 'Bacator', 'Galbenă Cadarca', 'Traminer', 'Sylvaner' and 'Ardeleana' were attacked to a lesser extent

In general, the mildew infestation in 1940 was so very severe that it caused the destruction of the entire crop in some regions and jeopardized not only the crop of the next season but also the existence of the vines themselves. In the Valea Călugărească region, old experienced wine-growers affirm that they have never known such a violent invasion of vine mildew and compare the losses suffered with those incurred with the first appearance of phylloxera and mildew in Rumania.

## LEGISLATIVE AND ADMINISTRATIVE MEASURES

**Germany.** — The Station for research on the Colorado beetle [*Leptinotarsa decemlineata*] at Kruft [see this *Bulletin*, 1941, No. 1, p 7] has recommenced activities as from April, 18, 1941 (*Nachrichtenblatt fur den Deutschen Pflanzenschutzdienst*, Berlin, Anfang Mai 1941, 21. Jahrg, Nr. 5, S 38)

**Germany (Alsace).** — A Decree of March 29, 1941 relative to bee protection prohibits the use of arsenical preparations on fruit trees and other horticultural plants and field crops when in flower, exception being made for vines, potatoes and asparagus in the case of liquid but not dust preparations (*Amtliche Pflanzenschutzbestimmungen*, Berlin, 1. Mai 1941, Bd. XIII, Nr. 4, S. 169).

**Germany (Protectorate of Bohemia and Moravia).** — Decree No. 422, dated October 10, 1940, modified the regulations regarding the uses of hydrocyanic acid gas, ethylene oxide and chloropicrin.

The sanitary regulations and precautionary measures forming the second part of Decree No. 176 of June 26, 1936 issued in the former Czechoslovakia are substituted by other regulations for the protection of the public against any possible danger from the use of these toxic gases. (*Amtliche Pflanzenschutzbestimmungen*, Berlin, 1. April 1941, Bd. XIII, Nr. 3, S. 116-122).

*** Decree No. 89 of December 5, 1940 comprises new provisions relative to the supervision of and trade in the products intended for the protection of plants and plant products against noxious pests.

Article I treats on the nature of the different control measures, supervision of their efficacy, preparation and packing.

The control measures officially authorized are registered at the Ministry of Agriculture.

Article II regards poisonous preparations dangerous to the general health, with special reference to the precautionary measures to be adopted

Article III deals with the working of the supervisory bodies the Plant Protection Organization at Prague for Bohemia and the similar organization at Brunn for Moravia.

This Decree will come into force six months after its promulgation. (*Ibid.*, S. 122-130).

*** By Notification of March 6, 1941, it is established that nursery products may only be placed on the market if the nursery in question is under official supervision. Only those persons who have been granted the necessary permit will be allowed to hold nurseries. (*Ibid.*, 130-131).

**Germany (Hesse).** — By a Decree of June 22, 1938, the control of the corn weevil [*Calandra granaria*] has been made compulsory for all persons possessing stocks of grain or engaged in the processing of same into food or fodder products. They will be required to carry out the instructions given them by the Plant Protection Service. (*Amtliche Pflanzenschutzbestimmungen*, Berlin, 1. Mai 1941, Nd. XIII, Nr. 4, S. 169-170).

**Germany (Lorraine).** — The offices of the Plant Protection Service under civil administration have been installed at Kaiserslautern, Mühlstrasse 16. (*Nachrichtenblatt für den Deutschen Pflanzenschutzdienst*, Berlin, Anfang Mai 1941, 21. Jahrg., Nr. 5, S. 40).

*** A Decree of April 26, 1941 relative to the sale of toxic preparations employed in the control of plant pests comprises provisions similar to those adopted in the Reich as according to Police Ordinance of February 13, 1940 [see this *Bulletin*, 1940, No. 6, pp. 121-122]. (*Ibid.*, Anfang Juni 1941, Nr. 6, S. 48).

**Germany (Prussia).** – By Decree of May 22, 1941 the control of the 'Rapsglanzkäfer' [*Meligethes aeneus*] is made compulsory in the region in the circumscription of Oldenburg, Sleswig-Holstein where colza and rape are grown on a commercial scale. The apparatus required for control operations, supplied gratis to the growers concerned, will be utilized with due care and returned in good condition. This Decree remains in force up to June 30, 1941 (*Amtliche Pflanzenschutzbestimmungen*, Berlin, 1. Juni 1941, Bd. XIII, Nr. 5, S. 208).

**Argentine Republic.** – The Ministerial Resolution No. 14.644 of May 27, 1940 regulates the transport of cottonseed in the zones infested with the pink bollworm (*Platyedra gossypiella*) as so considered by Decree No. 37 841, dated August 5, 1939 [see this *Bulletin*, 1939, No. 12, p. 294]. (*Gaceta Algodonera*, Buenos Aires, junio 30 de 1930, año XVII, nº. 197, págs. 15 y 16).

*** Decree No. 85.584 of March 1, 1941 declares as 'plaga vegetal' the leguminous plant *Prosopis ruscifolia*, commonly known as 'vinal'. (*Boletín Oficial de la República Argentina*, Buenos Aires, 13 de marzo de 1941, año XLIX, núm. 13.972, pág. 3).

**Belgium.** – By Decree of May 15, 1941, the capture of sparrows by means of draw-nets ('tirasse') only, is authorised up to August 31, 1941 inclusive, throughout the country subject to certain conditions. (*Moniteur Belge*, Bruxelles, 30 mai 1941, nº 150, p. 3812-3813).

**United States of America.** — It has been found as a result of further experiments with treatments for freeing nursery stock and potted plants from the immature stages of the Japanese beetle [*Popillia japonica*], that 2 ½ pounds of methyl bromide per 1,000 cubic feet applied for a period of 3 ½ hours at a temperature of not less than 57° F., or for 3 hours at not less than 60° F., is sufficient to kill such larvae.

The Japanese beetle administrative instructions have been accordingly revised on April 11, 1941 to authorize the use of such treatments. (*B. E. P. Q. 499, Supplement No. 1 — Third revision*, [Washington, D. C.], 1941, 2 pp. [mimeographed]).

**Italy.** — A Ministerial Decree, dated January 31, 1941, orders the destruction of phylloxera-infested vines and also of disease-free vines in the protection zone of the phylloxera foci discovered during the year 1940 in the Castelli Romani and also in the Campagna romana. (*Bollettino Ufficiale del Ministero dell'Agricoltura e delle Foreste*, Roma, 21 maggio 1941, anno XIII, n. 15, pp. 876-877).

*** By a Ministerial Decree of March 26, 1941 a competition was opened for the award of eleven scholarships for advanced study at the Royal Institutes for scientific research and experimentation in plant pathology and agricultural entomology and at the Royal Observatories for plant diseases. (*Gazzetta Ufficiale del Regno d'Italia*, Roma, 8 maggio 1941, anno 82º, n. 109, p. 1804).

*** By Ministerial Decree of May 26, 1941, the territories of all the communes of the Province of Avellino are declared infested with grape phylloxera. (*Ibid*, 3 giugno 1941, n. 129, p. 2161).

of Armento, Province of Potenza, is also infested with grape phylloxera. (*Ibid.*).

**Peru.** — Owing to the presence of the pink cotton bollworm (*Pectinophora* [*Platyedra*] *gossypiella*) in the Province of Manabí in the neighbouring Republic of Ecuador, a Resolution of January 27, 1941 prohibited all importation whatsoever across the Ecuador frontier into Peru of unginned cotton, cottonseed, press-cake and fibre.

At the same time direct transit of trucks or other vehicles from Ecuador into Peru through Aguas Verdes-Huaquillas was prohibited.

The customs officers on the Ecuador frontier are to maintain most strictly the aforesaid regulations and also to inspect carefully all lorries or trucks arriving at the frontier, the said officers will confiscate and burn all products, the import of which is prohibited according to the Resolution in question.

The transport of unginned cotton, cottonseed, press-cake and cotton fibre from Ecuador either by boat or by planes stopping in Peru is prohibited.

Cotton cultivation in the littoral province of Tumbes is also prohibited. The cotton plantations in the Tumbes Valley and in the Quebrada del Máncora as well as cotton plants of the Pima variety and other cotton plants growing wild will be destroyed by the Piura ' Brigada de Sanidad Vegetal '. (*La Vida Agrícola*, Lima (Perú), febrero 1º. de 1941, vol. XVIII, No. 207, pág. [151]).

**Rumania.** — A Ministerial Decree of December 18, 1940 establishes that consignments of cut flowers to Arad, Timişoara, Bucharest, Constanţa, Sibin, Braşov, Brăila and Galaţi are exempt from the usual customs inspection at the frontier. The said consignments, instead of being inspected at the frontier customs office, will be examined at the local offices of the Phytosanitary Inspection Service operating in the aforesaid localities. (*Monitorul Oficial*, Partea I-a, Bucureşti, 8 Ianuarie 1941, Anul CIX, Nr. 6, pag. 98).

**Switzerland (Fribourg Canton).** — A Decree of May 21, 1940 lays down the provisions relative to the control of the Colorado beetle [*Leptinotarsa decemlineata*].

All persons who discover the beetle in question either in the adult, larval or egg stages are required to report same immediately to the communal deputy for Colorado beetle control, who, in turn, will communicate with the cantonal Station for crops and phytopathology.

The transport of beetles in any stage whatsoever is strictly prohibited.

The cantonal Station for crops and phytopathology is commissioned with the organization of Colorado beetle control in the Canton in agreement with the federal authorities.

Merchants engaged in the seed potato trade are required to keep an exact account of their operations, that is, they must give an account of all buying and selling operations and details on origin, consignee, variety and quantity of seed potatoes sold.

All potato growers must have the necessary means to protect his crops from the Colorado beetle. Control operations may be entrusted to specialized operators.

Arsenical preparations are only suitable for use on crops grown on a commercial scale. Special precautions have to be observed when employing arsenical products. Any ingestion of toxic salts will be avoided. All packing material must be destroyed.

The use of arsenical products on potato plants grown contiguous to vegetables or on truck crops (tomatoes, etc.) is strictly prohibited. Rotenone preparations which are not dangerous to man or domestic animals will be employed.

Preventive treatment which in some cases is advisable, is optional and entirely at the expense of the grower who will purchase the necessary products from the local trade. The cantonal Station for crops and phytopathology will, if requested, furnish useful information.

Control operations, ordered by the said Station, are carried out on foci and larvae. These operations are compulsory and can be executed with products supplied at a reduced price.

The Federation of the Agricultural Associations of the Fribourg Canton has been nominated as supply centre for the sale of products at reduced price to be used in the control of the Colorado beetle. (*Bulletin officiel des lois, décrets, arrêtées et autres actes publics du Gouvernement du Canton de Fribourg*, Fribourg, 1940, année 1940, 109ème vol., p. 79-82).

*** By Decree of December 20, 1940, as from January 1, 1941, poisoned wheat, freshly prepared, must be coloured green.

Only pharmacists and druggists are authorized to sell this grain.

As in the case of arsenical products employed in the control of plant pests, poisoned grain can only be sold in special containers, labelled in large red letters on a white ground ' Deadly Poison ' and a Caput mortuus.

Supervision of the trade in and use of poisoned grain is entrusted to the Cantonal Analytical Laboratory. (*Ibid.*, p. 117-118).

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## NOTES

**A Laboratory of Tropical Mycology and Phytopathology.** — A Laboratory of Tropical Mycology and Phytopathology has been established at the Practical School for Advanced Study with headquarters at the National Museum of Natural History, 12, rue de Buffon, Paris (V$^{e}$).

Prof. UGO PAPI, *Segretario generale dell'Istituto, Direttore responsabile.*

PRINTING OFFICE CARLO COLOMBO — ROME, JULY 24, 1941.

# INTERNATIONAL BULLETIN OF PLANT PROTECTION

## *DISCOVERIES AND CURRENT EVENTS* *

### PORTUGUESE EAST AFRICA.

### Movements of the Red Locust, *Nomadacris septemfasciata* †

The following is a brief summary of the observations made during the period April-September 1940:—

April. — Hoppers in two districts of the Province of Nyassa; swarms passed over the Provinces of Zambezi and Sul do Save as well as in the Territory of Manica and Sofala.

May - Swarms passed over the three provinces and the aforesaid Territory.

June. — Swarms passed over the three provinces; no activity in the Territory.

July. — As previous month.

August. — Swarms passed through the three provinces; scattered movements throughout the Territory.

September. — Nothing to report in the Province of Nyassa; passage of swarms in the other two provinces; locusts found scattered in various parts the Territory.

### ARGENTINE REPUBLIC.

### Wilting of the Terminal Bud in Potato §

During the years 1937-38 and 1938-39, potato crops suffered severe damage, especially the Green Mountain variety, the most extensively cultivated, owing to the appearance of a new disease called 'marchitez del brote terminal' (wilting of the terminal bud), its cause being unknown.

* Under this and the next heading the countries are arranged in French alphabetical order.

† Communication from Sr. DOMINGOS FRIAS, Acting Chief of the Section of Agricultural and Forestry Zoology, Lourenço Marques, transmitted to the Institute by the 'Repartição Técnica de Agricultura', Colony of Mozambique.

§ Communication from the official correspondent of the Institute, Mr. JUAN B. MARCHIONATTO, Agricultural Engineer, Director of 'Sanidad Vegetal', Ministry of Agriculture, Buenos Aires, Argentine Republic.

The 'Dirección de Sanidad Vegetal' of the Ministry of Agriculture took immediate steps to deal with this important problem and the agricultural engineers Alfredo M. Offermann and Enrique R. Vitoria began investigations.

These two officers have studied the characteristics of the disease, conditions of transmission, physical and chemical properties of the virus which causes the disease and its classification.

The most characteristic symptoms of the disease are: etiolation of the bud tip, ring-shaped markings on the leaves and necrosis of the buds, aerial stalks and tubers.

From studies on transmission, it was found that the virus producing the disease can be filtered and successfully inoculated into the potato, tomato, tobacco and peppers, with difficulty into the dahlia; no results were obtained with *Calla*, lettuce, *Tropaeolum*, *Zinnia*, parsley, *Calceolaria* and *Petunia*.

The filtered juice of diseased plants remains infective for over two weeks and can stand dilution to 1 in 1000. The temperature of activity is above 65° C. The virus concentration is stronger in the leaves than in the stalks; it was also found that plants showing slight symptoms contain a virus having the same pathogenic capacity as badly infected plants. Bichloride of mercury only renders the virus inactive after five days. The virus purified by the Bawden and Pirie method has the property of deviating polarized light. According to these characteristics, this virus may be classified in the *Solanum Virus* 1 Orton according to K. M. Smith.

The experiments have also shown that the tubers even if severely attacked only spread virus to a very limited extent.

SPAIN.

## Progress of the Colorado Beetle in the Country *

Seeing that the invasion of the Colorado beetle (*Leptinotarsa decemlineata*) in France was spreading towards the south with foci in the frontier departments bordering Spain, an imminent appearance of this pest in Spanish territory was to be expected.

The first focus was reported in September, 1935 in the commune of Massanet de Cabrenys, Gerona Province, near the French frontier. Measures were taken to prevent all agricultural relations with the neighbouring zones: no agricultural products whatsoever allowed to be sent outside the commune; State purchase of entire potato crop for destruction; installation of netting in the river to prevent any insects being carried elsewhere by water; continual arsenical dusting and disinfection of the soil with carbon disulphide; establishment of a girdling zone where the cultivation of the potato and other Solanaceous plants which can serve as host plants for this insect was prohibited, at the same time, a control and protection zone extended along all the frontier zone from

* Communication from the official correspondent of the Institute, Sr. AUGUSTÍN ALFARO, Agricultural Engineer, Director of the Phytopathological Station, Zaragoza, Spain.

the Cantabrian Mountains to the Mediterranean. An intensive propaganda campaign was carried out by means of lectures, leaflets, brochures, postcards and posters. Despite these various measures, further invasions from France (some recognized tardily) were reported in the Provinces of Gerona, Guipúzcoa, Navarra and Lérida. Infection spread from the North to the South of these provinces and to the neighbouring provinces.

It may now be taken that the Provinces of Navarra and Gerona are completely invaded and foci are scattered throughout a good part of the Provinces of Guipúzcoa, Alava, Huesca and Zaragoza.

The control methods employed are:

Regulation of trade in potatoes and inspection of crops. — When Colorado beetle foci are discovered, an 'invaded zone' is delimited from which no potatoes, peppers, tomatoes or egg-plants can be removed, nor any other plants and parts of plants (trees, shrubs, tubers, bulbs, cuttings, etc.); this is also the case for soil, manure, etc.

The zone surrounding the invaded zone and 25 km. wide is the 'protection zone' from which the above-mentioned products may be exported but only from November 1 up to March 15 and observing certain precautions. The zone, also 25 km. wide, outside the protection zone is known as the 'precaution zone'.

In these three zones, at various periods, the potato fields are inspected by the growers themselves, the local inspectors nominated by the communes, and the cantonal inspectors who apply immediately the orders of the provincial agricultural Committees, of which the crop diseases and pests Sections ('Secciones de Fitopatologia y Plagas del Campo') are commissioned with the execution of the control campaign; the activity of these Committees is coordinated by a Delegation under the Department of Agriculture.

In the invaded and protection zones, the cultivation of the potato simultaneously with any other food crop is prohibited. In the farms in the former zone where an invasion was noted during the previous year, the potato is sown widely spaced and an endeavour is made to keep leaves near the old foci to feed the insects and thus prevent them from spreading.

Treatment of foci. — The foci where the plants are few are destroyed *in situ* by fire after having been previously soaked with petrol, using a pressure pump. Carbon disulphide is used for disinfecting the soil. In the case of larger foci, hand collection is carried out and, at intervals, frequent dusting with diplumbic arsenic at 1 per cent.

Rotenone products are used for treating tomatoes and egg-plants.

Preventive treatment. — Within an area of 500 m. about the foci, the potato fields are throughly treated with 1 per cent. diplumbic arsenic dusts.

The extension and application of some of these control measures were checked by the events of the Spanish Civil War as also by the present war which restricts the efficacity of the proposed control plan.

## *LEGISLATIVE AND ADMINISTRATIVE MEASURES*

**Chile.** — For phytosanitary purposes Decree No. 40, dated January 24, 1941, prohibits the dispatch of certain plant products in the fresh state to South Antofagasta. (*El Agricultor del Norte*, La Serena, abril de 1941, año 25, nº 4, págs. 138 y 139).

**Colombia.** — Owing to an error in the text, the Law No. 40 of November 18, 1940 [See this *Bulletin*, 1941, No. 4, p. 74] has again been published. (*Diario Oficial*, Bogotá, 21 de noviembre de 1940, año LXXVI, núm. 24518, pág. [4971]).

*** Decree No. 110 of January 24, 1941 contains the measures relative to the organization of the control of banana diseases and pests in the Department of Magdalena. (*Ibid.*, 29 de enero de 1941, núm. 24574, pág. 305).

**Ecuador.** — Special Regulation No. 30 of November 11, 1940 lays down different measures relative to the organization and execution of the control of fruit fly [*Anastrepha*] and other pests and diseases found in fruit orchards and nurseries. (*Registro Oficial*, Quito, 15 y 16 de noviembre de 1940, año I, núms. 62 y 63, págs. [335] a 338).

**Italy.** — Ministerial Circular No. 62 of April 24, 1941 authorizes the hunting of sparrows by any means whatsoever with a view to protecting the grain crops. (*Bollettino Ufficiale del Ministero dell'Agricoltura e delle Foreste*, Roma, 11 maggio 1941, Anno XIII, n. 14, p. 843).

*** With a view to preventing any delay or check in sending abroad potatoes produced in Italy, Ministerial Circular No. 68 of May 4, 1941 recapitulates the measures at present in force regarding the import of these tubers into the following countries:— Germany, Protectorate of Bohemia and Moravia, Slovakia, Hungary, Denmark, Belgium, Sweden, Norway and Switzerland. (*Ibid.*, 21 giugno 1941, n. 18, pp. 1036-1041).

*** Ministerial Circular No. 69 of the same date regards the phytosanitary regulations to be followed for the export of fresh cherries in Germany, and other countries such as Belgium and the Netherlands. (*Ibid.*, pp. 1035-1036).

*** Royal Decree Law No. 412, dated May 15, 1941, modifies the custom duties on potassium and sodium cyanides. (*Gazzetta Ufficiale del Regno d'Italia*, Roma, 31 maggio 1941, anno 82º, n. 127, pp. 2118-2119).

*** By Provision P. 68 of May 21, 1941, the Ministry of Corporations has established the price of the anticryptogamic product 'Ramital'. (*Ibid.*, 30 maggio 1941, n. 126, p. 2115).

*** Royal Decree No. 489 of May 29, 1941 provides for the reorganization of the Services as well as the revision of the duties of the personnel of the Ministry of Agriculture and Forests.

Among the various measures contained therein, the following refer more directly to plant protection.

The Upper Board of Agriculture and Forests, consultative technical organ of the Ministry, has been instituted.

Section I of this Board is concerned with all activities regarding agricultural experimentation and phytopathology (plant diseases and pests). This Section, as regards all matters concerning the protection of cultivated plants and relative measures, comprises: (1) the Director General of Public Health, (2) a Delegate of the Fascist National Institute for foreign trade, (3) a Delegate of the National Federation of Provincial Consortia among the agricultural producers (4) two experts in phytopathology selected among the directors of the Royal Institute for Experimentation in Plant Pathology at Rome and the R. Institute for Experimentation in Agricultural Entomology at Florence and the professors of plant pathology and entomology at the Royal Universities, a director of the regional Observatory for plant diseases.

It is also the province of the Board, joined in general assembly, to examine proposals regarding the declaration of compulsoriness in the case of destructive measures and the exclusive adoption of determined means and methods in the control of plant diseases and pests.

Section I of the Board passes opinion on the technical and economic problems connected with agricultural experimentation and the protection of cultivated plants from pest and disease attack. In particular, the opinion of the Board must be considered, *inter alia*, on. (1) the programs of work relative to protective measures against diseases, parasites and pests in general of crops and agricultural products, (2) ascertaining of the conditions for the direct undertaking of locust control, on the part of the Ministry.

The Section also sees to the compilation or modification of—

(*a*) the list of the parasites of plants, part of plants and seeds, considered harmful or suspected of being so to agriculture, (*b*) the measures to be prescribed for preventing the spread of parasites, (*c*) the list of disinfection and control methods and measures to be adopted against plant diseases and pests, (*d*) the eventual measures to be adopted in the case of plants, parts of plants, seeds and other plant products having to be destroyed, (*e*) list of plants, parts of plants, seeds and other plant products, hosts or vectors of harmful or suspected plant diseases and pests, as regards both internal movements and imports or exports; (*f*) the measures to be followed in dubious cases regarding the presence or nature of a disease, with the necessity of ordering quarantine for a certain period; (*g*) the provisions relative to the use of special packing for plants,

parts of plants, seeds and other plant products which may act as hosts or vectors of harmful or suspected diseases.

On the sixtieth day after publication of this Decree, *inter alia*, the Committee for plant protection against diseases ceases to function.

In the provincial Inspectorates of Agriculture of those provinces which, not more than sixty in number, will be established by Ministerial Decree, a specialized Section for plant protection will be instituted. To each of these Sections, which may also be established gradually, will be appointed an agricultural technician recognized as specialist in phytopathology.

Within two years of the entering into force of this Decree, some of the present agricultural experiment Stations are to be changed into demonstration farms or into organizations for the functions regarding plant diseases.

Until the Royal Institutes for Experimentation in Agricultural Entomology at Florence and in Plant Pathology at Rome are instituted, the directors of the present Royal Stations of Agricultural Entomology at Florence and Plant Pathology at Rome may be called upon to take part in Section I of the Upper Board of Agriculture and Forests, in their capacity as experts in phytopathology. (*Ibid.*, 16 giugno 1941, n. 139, pp. 2352-2370).

*** A Ministerial Decree of May 29, 1941 declares the territories of the communes of Naples and Sorrento infested with the Argentine ant [*Iridomyrmex humilis*] and makes the control of this insect compulsory. *

*** A Ministerial Decree of June 5, 1941 renders the control of the olive fly [*Dacus oleae*] compulsory in the commune of Pisciotta, Province of Salerno during the current year. (*Bollettino Ufficiale del Ministero dell'Agricoltura e delle Foreste*, Roma, 1º luglio 1941, anno XIII, n. 19, p. 1076).

*** A Ministerial Decree of July 1, 1941 renders compulsory during the year 1941, the control of the olive fly [*Dacus oleae*] in the territories of the communes of Alghero and Olmedo, Province of Sassari, by means of arsenical dusts. *

*** A Ministerial Decree of July 26, 1941 establishes the modalities for the import from abroad, as an exceptional case, of potatoes intended exclusively for planting for the 1941-42 season.

The import of tubers from crops affected by virus diseases or coming from localities attacked by *Leptinotarsa decemlineata*, *Synchytrium endobioticum*, *Phthorimaea operculella*, *Heterodera rostochiensis*, *Epitrix cucumeris* and other parasites not allowed by the supervising organizations of the producing countries, is prohibited. (*Gazzetta Ufficiale del Regno d'Italia*, Roma 31 luglio 1941, anno 82º, n. 179, pp. 3049-3051).

* Communication from the Ministry of Agriculture and Forests, Rome, to the International Institute of Agriculture.

**Norway.** — A Decree of May 15, 1941 prohibits the treatment of plants in the flowering stage with preparations containing arsenic. (*Norsk Lovtidend*, Oslo 23 mai 1941, nr. 20, side 415).

**Portugal.** — 'Portaria' No. 9.792, dated May 8, 1941, declares compulsory the control of the codling moth (*Carpocapsa* [*Cydia*] *pomonella*), the pear scab (*Fusicladium pirinum*) and other diseases attacking the orchards in the parishes of Abidos (S. Pedro) and Amoreira, commune of Obidos, as well as in the parish of Roliça, commune of Bombarral. (*Diário do Govêrno*, Lisboa, 8 de maio de 1941, I Série, núm. 705, pág. 410).

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# INTERNATIONAL BULLETIN OF PLANT PROTECTION

## *DISCOVERIES AND CURRENT EVENTS* *

**ARGENTINE REPUBLIC.**

### An Epiphytotic of Potato Blight †

During the month of January, 1941, the potato blight (*Phytophthora infestans* [Mont.] de Bary) made its appearance and spread with all the characteristics of a true epiphytotic through the crops along the Atlantic coast in the South-East of Buenos Aires Province, from General Madariaga to Quequén, Necochea, falling in intensity towards the South and the West.

The damage caused by this disease was particularly severe in early varieties, but much less in the late types. The most susceptible varieties were 'White Rose' and, to a lesser extent, 'Green Mountain' and 'Katahdin', on the contrary, 'Alma' showed a very high degree of resistance.

The prophylactic measures taken by the Department of Agriculture on the appearance of the potato blight made it possible to check considerably its development among the late crops.

**RUMANIA.**

### Wheat Rusts and Wheat Scald during the Year 1940 §

The observations given in this study cover the crop year 1939-40 and refer to Rumania before territorial changes took place.

I. — Rusts.

A light attack of brown rust of wheat (*Puccinia triticina*) occurred here and there during the autumn of 1939. This autumn attack was of a sporadic character, low intensity and did not in any way influence the spring infestation of brown

* Under this and the next heading the countries are arranged in French alphabetical order.

† Communication from the official Correspondent of the Institute, Sr. Juan B. Marchionatto, Agricultural Engineer, Director of the 'Sanidad Vegetal', Ministry of Agriculture, Buenos Aires, Argentine Republic.

§ Communication from the official Correspondent of the Institute, Mr. Traian Săvulescu, Professor at the Faculty of Agronomy, Chief of Phytopathological Section at the Institute of Agricultural Research of Rumania, Bucharest, Rumania.

rust. The first uredospore pustules of brown rust appeared fairly early in spring (April 18). At this period there were only a very few deposits of uredospores on the wheat leaves, but numerous discoloured patches were noted, proving that the first infestation had taken place. Infestation only advanced slowly during spring, owing to the low temperature which prevailed and it was only at the beginning of June that deposits of uredospores were observed sufficiently numerous to allow of the notation of different wheat lines as regards their degree of susceptibility to brown rust

Towards the end of June, in the Titu region, brown rust infestation was fairly severe, being marked as 4. The rust occurred with an equal intensity on all the leaves from the base to the tip of the plants. At this period, the presence, on the sheaths, of a few uredospore deposits of black rust (P. *graminis*) were also observed.

Observations made in different wheat fields towards the end of the vegetative period gave the following results as regards rust infestation in 1940:

In the Danubian Plain, from Feteşti to Olteniţa and up to the Station of Bărăganul, Mărculeşti (Ialomiţa Department), all leaves of wheat were attacked by brown rust and the severity of attack was marked as 4. Infestation was not limited to the lamina, but also occurred on the sheath where its intensity was designated as 3-4 on the first sheath, and 2-3 on the second; on the upper internode, intensity of attack was marked as 3 and sometimes even 4, while it was noted as 1-2 or even 3 on the lower internode where infestation was not quite so severe.

It was noted that on the culms, brown rust was generally mixed with black rust; in many wheat fields of this region, black rust infestation also spread to the ears, although only of slight intensity.

In the communes of Mihăileni, Gorneni, Stâlpu, Ghimpaţi, Naipu, Prunaru and Drăgăsani, in the Vlaşca Department, infestation of black rust was severe, occurring on the upper internode of the stem; here intensity of attack was marked as 3-4, while on the second internode, it was marked as 2-3.

Black rust not only attacked the culms, but also appeared on the sheath of the upper blade where it was marked as 2; on the ears, infestation was slight although the awns were also attacked as indicated by a few scattered pustules. A heavy infestation of brown rust was observed on the lamina, being marked as 3-4; brown rust was also observed on the sheaths, but only as rare deposits of uredospores and teleutospores.

In the Teleorman Department, from Vităneşti to Alexandria and Ologi, and up to Turnu Măgurele, infestation of wheat rusts presented the same aspect as in the Vlaşca Department, but in general, not so severe; black rust attack, on the whole, was slighter than in the Vlaşca Department.

In the Romanaţi Department, from Islaz to Corabia, as well as in the districts of Vişina Veche, Studina, Deveselu, Caracal, Radomir, Zănoaga and Leu, black rust infestation was not so severe as in the Departments of Teleorman and Vlaşca, the maximum marking being 2-3. In some fields where the wheat had arrived at the ripening stage before the period of black rust attack, infestation was very slight and even nil. In the Dolj Department, apart from the Jiu Val-

ley, black rust attack was even less severe than in the Romanaţi Department. In the Jiu Valley, however, in some parts and especially where growth had been retarded, black rust infestation had the same intensity as in Romanaţi Department A severe attack of brown rust, however, was reported in the Departments of Romanaţi and Dolj. This infestation has not had an excessive influence on the quality and quantity of the wheat produced this year.

In the Mehedinţi Department, especially about the centre where the wheat was still green at mid June, it was found that black rust attack was more severe than in the Departments of Dolj and Romanaţi, having a similar intensity to that in the Departments of Vlaşca and Teleorman. In the Mehedinţi, black rust infestation on the stem was marked as 3-4 and on the sheath as 2-3 In this Department infestation did not spread to the ears, although it occurred in Muntenia. Intensity of attack also varied according to the situation of the fields. In the fields placed along the valleys, where the growth of the wheat was retarded, attack was more severe than in the fields where the wheat arrived at maturity sooner and where in most cases the crop escaped black rust infestation Thus in the low-lying region of Butoeşti, Strehaia, Târuna attack was more intense than in the hilly region of Prunişor-Balota.

In the Severin Department, from Orşova to Mehadia, intensity of attack was equal to that in the Mehedinţi Department In this region, infestation of the straw by black rust was marked as 2-3. From Mehadia towards Poarta and from there towards Caransebeş, there was no infestation of black rust or, if so, only a very few sporadic cases In this region, however, the grain was attacked by brown rust with the same intensity as in the other provinces of the country.

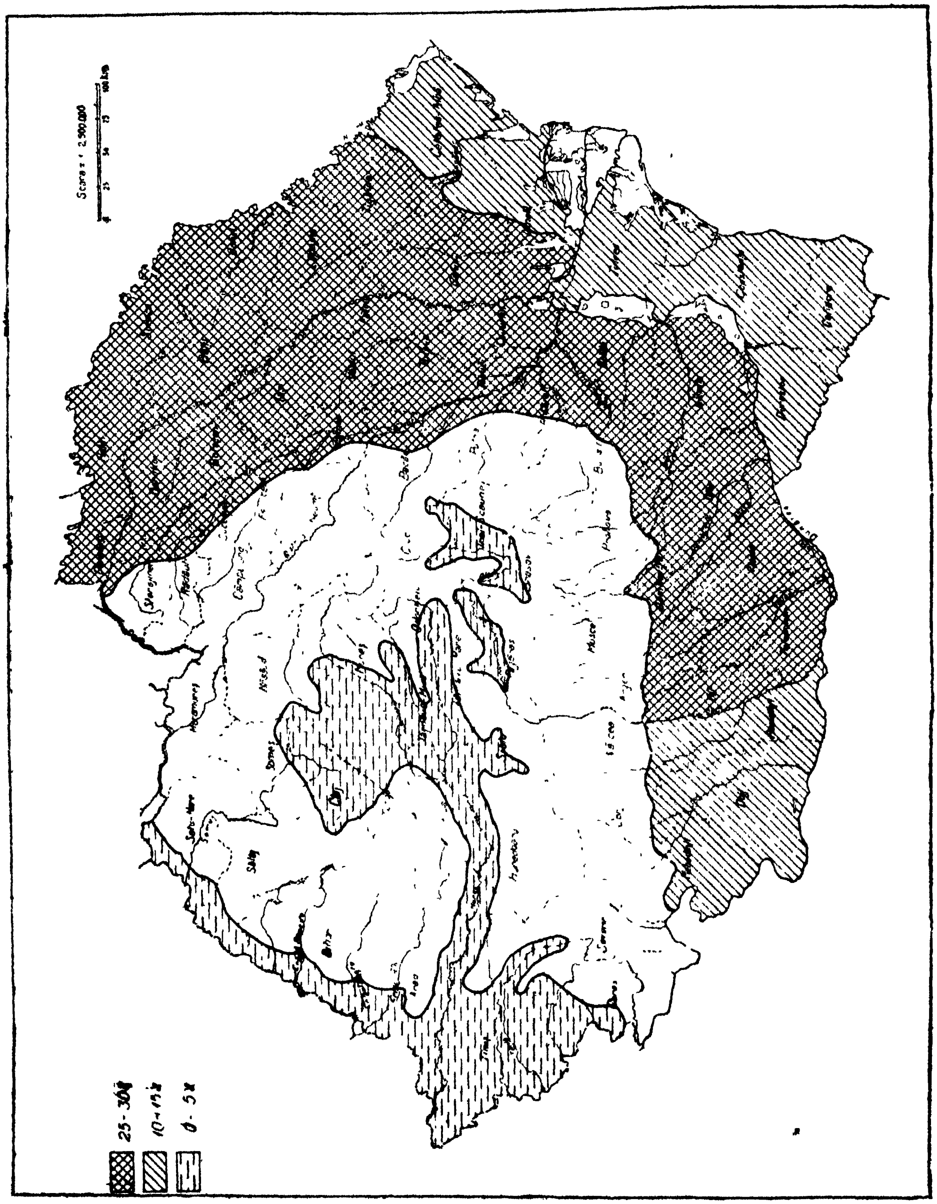
Between Caransebeş and Lugoj cereals were not attacked by black rust, on the leaves, however, a slight infestation of brown rust was noted. Nevertheless in this region also, in the commune of Găvăjdia where the fields were inundated in spring, causing retarded growth, infestation of black rust was fairly intensive, on the upper internode it was marked as 4 and on the sheath as 2

To the North-East of Lugoj in the direction of the Hunedoara Department, in the communes of Bujor and Făget where the crop was still green on June 20, the plants were attacked on the sheaths and culms, intensity of infestation being marked as 4, in the same region, severe infestation of brown rust was observed on the lamina, also marked as 4.

In the Mehedinţi Department between Balota and Prunişor and in the Severin Department between Mehadia and Poarta as also between Poarta and Caransebeş, a slight attack of yellow rust was also reported as seen by the presence of uredospores chiefly on the sheaths and sometimes even on the stems In the Hunedoara Department, black rust occurred chiefly on the straw and also on the sheaths and was marked as 1-3, but, in general, the intensity of this attack was marked as 2. In the Mureş Valley, at Ilia and Bejan, infestation was more severe.

In the Alba Department, black rust attack was very slight From Abrud towards Cărpiniş, Sartoş, Brăzeşti and Sălcuia, there was practically no infestation of black rust; on the other hand, in this region, all the grain was attacked by brown rust but the intensity of attack was not very great, on the lamina being marked as 2-3.

In the Turda Department, as well as in the region of Turda, Unirea, Războeni and Ludoş, black rust infestation was very slight, only occurring in the form of a few uredospore deposits on the sheaths and the culms. In the Mureş




Losses in wheat crops during the year 1930 caused by rusts.

Department, black rust infestation was also slight. In this region, during the autumn, the weather having been favourable, sowing was carried out in time and accordingly the wheat attained maturity before the period of black rust

infestation. In the regions which suffered from inundations or excessive rains as also along the valleys, the growth of the grain was slightly retarded and the plants were easily attacked by black rust; the losses reported, however, were not excessive. In the communes of Cucui, Iernet, for example, black rust infestation on the stem was marked as 1 and on the sheath as 2 In the region which extends between Târgu-Mureş and Sovata and also at Târgu-Mureş, the grain was ripe by July 20, the crop had already been harvested in some parts and no black rust attack was reported In this region as elsewhere, the plants were attacked on the lamina by brown rust, intensity of attack was marked as 2-3. In the Odorhei Department from Praid to Odorhei, the crops escaped black rust infestation.

In Moldavia, in the Bacău Department, by July 20 the wheat was still green and was severely attacked by black rust, intensity of infestation on the sheath was marked as 3 4 and on the upper part of the straw as 3. In the Putna Department towards Mărăşeşti, black rust infestation was also very severe, even more intense than in the Bacau Department. In this region, intensity of black rust infestation on the upper internode of the stem was marked as 4, on the second internode of the stem as 3 4, on the first and also the second sheath as 2-3 and on the ear as 1-2. Such was the invasion of black rust not only in the vicinity of Mărăşeşti but throughout the Department of Putna Besides black rust attack on the culms, sheaths and ears, there was also a very severe infestation of brown rust on the lamina, intensity of attack being marked as 3-4 In the Râmnicu Sărat Department growth was more advanced and on July 21 when these fields were visited, wheat was already being harvested in some parts In this Department, black rust infestation was less severe than in Moldavia, being marked as 2 for the upper internode of the stem, 3-4 for the second internode and 3-4 for the sheaths. This notation could only be made where the crop sown later than usual or along the valleys, was still green by July 21 In the Buzău Department up to Mizil and in the Prahova Department, the grain in the mature stage was not attacked by black rust, but the lamina was severely attacked by brown rust. On the grain which had not attained maturity by July 20, intensity of black rust attack was marked as 3-4 for the upper internode and 1-3 and even 3 for the sheath

In general, the invasion of black rust in the wheat fields during the summer of 1940 presents the following characteristics: In the Danubian Plain black rust attack was fairly intense, but slightly less in the Departments of Oltenia where the growth of the plants was more advanced at the time of infection. In Banat and Transylvania, black rust infestation was very slight and in some districts was not reported at all, especially where the crop had been sown very early. Even in these provinces, however, fairly severe attacks of black rust were reported in the regions which had suffered from inundation and also along the valleys where growth had been retarded. In Moldavia and in the middle part of Bessarabia, the intensity of attack of brown and black rust was similar to that observed in the Danubian Plain. The losses in wheat crops during the year 1940 caused by rusts are indicated on p. 184.

*(to be continued)*.

## *LEGISLATIVE AND ADMINISTRATIVE MEASURES*

**Germany.** — A Circular of March 26 1941 relative to the Decree of August 25, 1938, amended by Decree of February 2, 1941 regarding the use of ethylene oxide [see this *Bulletin* 1939 No 2 pp 28 29 and 1941, No 5, pp 94-95] explains in detail the regulations to be observed in the use of this gas

The following appendices are given in this Circular (*a*) a sample copy of the application to be made for a permit authorizing the use of ethylene oxide in the control of parasites (*b*) a sample copy of the aforesaid permit (*c*) a sample copy of the report to be made after fumigation operations (*d*) a sample copy of the warning notice to be hung outside the premises during fumigation treatment with ethylene oxide (*e*) an exact description of the different methods used for detecting the eventual presence of any remaining gas after fumigation (*Amtliche Pflanzenschutzbestimmungen* Berlin 1 Mai 1941 Bd XIII Nr 4 S 156 164)

*** Dated on April 4 1941 in No 80 of the *Deutscher Reichsanzeiger und Preussischer Staatsanzeiger* is given the new list of the communes infested with grape phylloxera [*Dactylosphaera vitifolii*] and those suspected or in danger of being so infested (*Nachrichtenblatt fur den Deutschen Pflanzenschutzdienst* Berlin Anfang Mai 1941 21 Jahrg Nr 5 S 40)

*** A Decree of April 2 1941 amending that of July 17 1934 relative to the the use of virulent poisons in pest control see this *Bulletin* 1934, No 11 p 247 and 1936 No 8 p 173 prohibits insofar as vines are concerned the use of arsenical preparations after June 30 (*Amtliche Pflanzenschutzbestimmungen* 1 Mai 1941, No 4 S 164)

*** The ninth Decree of April 22 1941 relative to the Colorado beetle (*Leptinotarsa decemlineata*) modifies the sole text laid down by the seventh and amended by the eighth Decree see this *Bulletin* 1939 No 7 pp 157 159 and 1940, No 10, p 193]

The first part comprises general provisions regarding the detecting as soon as possible of all fresh foci of the Colorado beetle

The second part relative to the preventive treatment of potato fields requires those concerned no longer employing trap bands to treat their crops with insecticides The use of arsenical powder preparations, however is prohibited Weeds in the flowering stage should be removed before beginning treatment.

The third part aiming at preventing the introduction of the Colorado beetle from other countries specifies that the importation of plants with earth attached to the roots from America, Belgium, France, the Netherlands, Switzerland and Liechtenstein is only authorized on the condition that the consignments are accompanied by a certificate of origin and health according to the form laid down by this Decree

The fourth part covers administrative provisions

Appendices to this Decree designate a new delimitation of the zones known as 'inspection zone (Überwachungsgebiet) and control zone (Bekampfungsgebiet) respectively (*Ibid* S 150 155)

**Germany (Protectorate of Bohemia and Moravia)** — Decree No 171 of March 27 1941 with a view to preventing the introduction of the carnation leaf roller (*Tortrix pronubana*) prohibits the import of rooted carnation plants and cuttings

The import of carnations (cut flowers) is prohibited throughout the period beginning April 30 and ending November 15 exception being made for flowers carried by travellers and not intended for commercial purposes (*Amtliche Pflanzenschutzbestimmungen* Berlin 1 Juni 1941 Bd XIII Nr 5 S 210)

*** Decree No 172 of the same date in order to prevent the introduction of diseases and pests of *Azalea indica* (= *Rhododendron indicum*) prohibits the importation of these plants attacked or suspected of being attacked by *Septoria azaleae Exobasidium azaleae Gracilaria azaleella and Acalla schalleriana*

Importation may be authorized however provided that each consignment is accompanied by a certificate granted by an officer of the Plant Protection Service of the country of origin testifying that the consignment in question has been inspected and has been found free from the aforesaid diseases and pests

Transit under customs supervision is permissible (*Ibid* S 211)

*** Decree No 188 of April 17 1941 requires proprietors and usufructuaries of all land whatsoever to destroy the rats thereon

The commanding administrative authorities may oblige the communes to carry out themselves the control of the rats infesting their respective territories, the proprietors and usufructuaries of land will give the personnel in charge of control operations every possible assistance and facility The communes will divide expenses among those concerned

In this control campaign the use of chemical preparations other than those authorized by the Ministry in charge is prohibited On the wrapper of these preparations must be indicated the name and address of the manufacturer date of preparation, weight duration of efficacy and precise indication of the active principle (*Ibid* S 211 213)

**Germany (Lorraine).** Disposition No 273 dated May 13 1941 with a view to encouraging the destruction of crows and magpies fixes at 30 Pf the bounty awarded for each pair of feet of these bird pests handed over to the authorities (*Amtliche Pflanzenschutzbestimmungen* Berlin 1 Juni 1941, Bd XIII, Nr 5, S 209)

**Germany (Prussia).** — A Decree of April 7, 1941 requires the holders of farm land in the Magdeburg District to see to the control of the onion fly [*Hylemyia antiqua*] according to the instructions issued by the Plant Protection Service

This Decree will be put into force by the administrative authorities as soon as, in any given region, the necessity arises.

On all fields where onions have been sown, should be spread onions cut in two and having been soaked in a sweetened solution of sodium fluoride for 5-10 minutes. The pieces of onion will be placed cut side upwards, a half onion about every 3 feet, first along the fifth row of seedlings, then the 20th, etc. that is, 15 rows apart.

It will be necessary during each of the subsequent two weeks, to resoak the onion halves in the aforesaid toxic solution. This operation should also be repeated after heavy rains.

For every hectare of land the following quantities for preparing the bait are required 50 kg. onions, 600 g. sugar, 500 g. sodium fluoride, 20 litres rain-water. The necessary material will be purchased in common and subsequently distributed to those concerned, among whom the cost will be divided

The Plant Protection Service fixes the date to begin control operations. The day selected is always after mid May. (*Amtliche Pflanzenschutzbestimmungen*, Berlin, 1. Mai 1941, Bd XIII Nr. 4, S 167-168).

*** By Decree of April 16, 1941, the control of the beetle on strawberries (*Rhynchites germanicus*) is made compulsory in part of the Wiesbaden district

The proprietors and usufructuaries of strawberry crops in the communes specified in this Decree are required to treat their crops before the flowering stage by effective control measures which will be indicated by the Plant Protection Service. This Service will fix, in agreement with the police authorities, the control methods to be employed by the parties in question (*Ibid* , S. 166-167)

**France.** — Law No. 1317, dated March 25, 1941, regards the organization of the field services for plant protection comprising nine regional phytosanitary inspectorships the territorial limits of which are fixed by Ministerial Decree of the Secretary of State for agriculture. (*La Pomme de Terre Française*, Lille, avril 1941, 4ème année, nº 22, p 5).

*** Law No. 1318 of March 25, 1941 organizes plant protection.

Article 1 establishes that the Ministerial Decrees of the Secretary of State for agriculture, taken after the decision of the consultative Committee on Plant Protection, fix the list of the plant or animal parasites of crops the control of which is compulsory and specify the measures to be employed.

Articles 2 to 7 regard the establishment of Associations for the control of crop pests and their working.

Articles 8 to 28 treat successively on the control of crop pests, nursery inspection, sanitary inspection of seed and plants other than nursery plants, supervision of imports and exports, and regulation of phytosanitary certificates and certificates of health and origin. (*Ibid.*, p. 5-7).

**Italy.** — By Royal Decree No. 825 of June 21, 1941, soldiers pertaining to the customs staff are placed at the disposal of the Ministry of Communications for the purpose of ensuring supervision of the production of anticryptogamic preparations containing copper salts. (*Gazzetta Ufficiale del Regno d'Italia*, Roma, 22 agosto 1941, anno 82°, n. 197, p. 3270).

*** Two Ministerial Decrees, dated July 8 and 11, 1941, authorize the hunting and capture of the wild rabbit [*Lepus* (*Oryctolagus*) *cuniculus*], declared a noxious pest in the territories of the Provinces of Como and Varese respectively. (*Ibid.*, 18 luglio 1941, n. 168, pp. 2851-2852).

*** A Ministerial Decree of August 18, 1941 authorizes the hunting and capture of the boar, declared a pest, in the territory of Imperia Province. (*Ibid.*, 26 agosto 1941, n. 200, p. 3315).

**Luxemburg.** — A Decree of March 26, 1941 relative to the control of the Colorado beetle (*Leptinotarsa decemlineata*) comprises the provisions corresponding to those of the first two parts of the Decree of April 22, 1941 in force in Germany (see this *Bulletin*, 1941, No. 10, p. 186). (*Amtliche Pflanzenschutzbestimmungen*, Berlin, 1 Mai 1941, Bd. XIII, Nr. 4, S. 170-171).

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*** An Order of October 31, 1940 regards the organization of circumscriptions for plant protection and the nomination of officers in the Division for agricultural production, trade and supplies in charge of plant inspection. (*Ibid.*, 8 novembre 1940, n° 1463, p. 1065-1066).

*** An Order of December 15, 1940 establishes that, for the control of the pink bollworm [*Platyedra gossypiella*] and the spiny bollworm [*Earias insulana*] the destruction of stalks, leaves, unharvested bolls and seed, and, in general, all cotton plant trash of the 1940 crop, must be carried out by burning before February 1, 1941 at the latest (*Ibid.*, 27 décembre 1940, nº 1470, p. 1216).

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## *NOTES*

**Spanish Istitute of Entomology.** — The 'Instituto Español d'Entomología' with which the former Entomological Section of the Museo Nacional de Ciencias Naturales' has been incorporated, has been established at Madrid

Prof. UGO PAPI, *Segretario generale dell'Istituto, Direttore responsabile.*

PRINTING OFFICE CARLO COLOMBO — ROME, OCTOBER 16, 1941.

# INTERNATIONAL BULLETIN OF PLANT PROTECTION

## DISCOVERIES AND CURRENT EVENTS *

### GERMANY.

#### New Blight-Resistant Potato Varieties †

Among the five potato varieties recently authorized for cultivation in Germany, there are three which are resistant to the potato blight (*Phytophthora infestans*). These new varieties enjoy protection not only against all fungus races, but also against the biotypes of group *A*, the most common in Germany. The varieties in question are 'Erika', produced by the 'Ragis' Association; 'Frühnudel' obtained by the plant breeder von Wiese at Knehden, and 'Robusta', created by the plant breeder von Pfetten at Niederarnbach. The 'Frühnudel' is a yellow cooking potato; the 'Erika' and 'Robusta' varieties belong to the industrial type, having a high starch content. Thus a problem which has been studied for almost a century by plant breeders has been solved, at least to an important extent in practical agriculture.

The three new varieties were obtained by crossing cultivated varieties with the 'W' varieties of the Biologische Reichsanstalt für Land- und Forstwirtschaft. The 'W' varieties originate from South American primitive forms imported and continually improved by this Institute since 1912. These have conferred to the cultivated varieties not only resistance to the *A* group of biotypes comprising the chief races of *Phytophthora* found in Central Europe, but also transmitted to them genes new to European potatoes, guaranteeing high yields. This is the reason for the heavy harvests obtained from these new varieties, 'Erika' and 'Frühnudel' in particular.

### RUMANIA.

#### Wheat Rusts and Wheat Scald during the Year 1940 (*concluded*) §

II. — SCALD.

As regards quantity and quality, 1940 was a poor wheat year, weight per hectolitre being under 80 kg. Though some grains weighed 75-78 kg. per hl., the majority, however, weighed less, in some regions as little as 70 kg. and even

* Under this and the next heading the countries are arranged in French alphabetical order.

† Communication from Dr. K. SNELL, Oberregierungsrat, transmitted by Dr. E RIEHM, Oberregierungsrat, President of the Biological Service of the Reich for Agriculture and Forestry, Berlin-Dahlem, Germany, official Correspondent of the Institute.

§ Communication from the official Correspondent of the Institute, Mr TRAIAN SĂVULESCU, Professor at the Faculty of Agronomy, Chief of the Phytopathological Section, Institute of Agricultural Research of Rumania, Bucharest, Rumania.

less. Quantitative production amounted to 755 kg. per hectare in the Danubian Plain, in Moldavia and in middle and north Bessarabia.

Owing to its inferior quality, the problem of the valorization of the wheat came up against serious difficulties and caused the State considerable expense in assisting the farmers.

Many farmers wonder what are the causes for the quality of Rumanian wheat in 1940 being so inferior, with such a low weight per hectolitre and a small and wrinkled grain.

In the following, an endeavour will be made to clear up the question.

As was said in the beginning, it is not a question of one but several causes. Each of these causes contributed to a decrease in the quantity of nutrients and, in particular, the carbohydrates contained in the grain resulting in wheat scald.

The consequences of this physiological disorder are that the grain remains small, does not accumulate a sufficient quantity of starch and shrivels.

To explain better this scald process, it may be recalled that up to maturity the wheat passes through four important stages:

(*a*) Milky stage. — At this moment the endosperm takes on a milky consistency due to the abundant transport of carbohydrates while the leaves and stalks are still green.

(*b*) Yellow stage. — At this period the wheat crop presents a homogeneous yellow colour, the endosperm looses its milky consistency and looks like thick glue, so that when the seed is pressed between the fingers it yields like a soft paste.

(*c*) Fully ripe stage. — At this period the grain separates from the peduncles and the glumes. The period of transition between the yellow stage and the fully ripe stage lasts three days if the weather is warm and dry.

(*d*) Overripe stage. — At the postmature stage the grain has lost a considerable quantity of water, has become dry and has the characteristic aspect and hardness of ripe wheat.

For the transport and accumulation of formative substances and, in particular, starch, in the grain to be normal, the four phases must succeed each other regularly according to a constant index of progression. Any disturbance in this regular succession has a harmful effect on the formation of the grain. When the phenomenon of scald takes place, the excessive heat during the period of the milky stage (month of June) causes not only the premature drying-up of the grain which loses much water, but also the premature withering of the last internode of the stalk.

Because of this the reserve substances are no longer synthesized and consequently can no longer be transported to the grain which remains small, light and shrivelled. This was the case in the previous year (1939).

Many farmers in areas where there was an abundant rainfall before the wheat ripened believe and affirm that the wheat was 'washed away' by the rains. They certainly are right but only in those cases when the abundant rainfall was immediately followed by excessive heat, the wheat being at the milky stage. Under these circumstances the phenomenon of scald is manifested resulting in severe

losses. The loss in weight of the affected grain may be as much as 40 per cent of the normal weight and the quality of the wheat is lowered by 10-15 per cent.

Scald causes other damage to the grain, the tegument of the grain may crack especially near the embryo which sometimes is also damaged. In general, seed affected with scald germinates normally, but the seedlings are small, weak, with stunted roots and frequently do not tiller. If autumn conditions are favourable, the seedlings may improve, but if the autumn is dry, many die off leaving bare patches in the field, during the winter, these plants are easily killed by frost.

Owing to the cracks in the tegument, the shrivelled grain is attacked by the solutions and powder preparations used in the control of wheat rot and, in particular by those containing copper sulphate and formaldehyde.

The phenomenon of scald may be aggravated by the intervention of two other concomitant phenomena, *viz.* lodging and wheat rusts.

When the weather is very wet before the wheat ripens, as was the case in 1940 in many parts of the country, the plants are unable to form their mechanical support tissue although they appear to be growing vigorously. Consequently the wheat is easily lodged by wind and rain. The resistance of wheat to lodging depends on a series of factors some are peculiar to the plant itself and are subject to laws of heredity, varying from one strain to another, others depend on climatic and soil conditions and cultivation technique.

Lodging does not always mean a loss, if it occurs after the milky stage the wheat is not affected and production does not fall. There is even a popular saying "when the wheat falls the farmer prospers." If lodging takes place at the milky stage and if, immediately after, heat and drought become excessive, the phenomenon of scald is much more marked in cereals which have been subjected to lodging. This was the case in 1939 in certain localities of Oltenia and in some districts of the Departments of Teleorman, Argeş, Dambovita and Prahova and in 1940 in the Danubian Plain, Dâmboviţa and Moldavia and in the greater part of Bessarabia.

Another factor which causes intensification of the phenomenon of wheat scald is rust attack. It is definitely known that scald can take place independently of rust attack, but when rusts and, in particular black rust, intervene, losses rise to a disastrous extent as was the general case in 1932 as well as in 1939 in certain regions of the country, along the Subcarpathian Hills, between Ploeşti and Buzau and in the Tara Bârsei, and in 1940, in the Danubian Plain, in Moldavia and in the greater part of Bessarabia.

Some farmers insufficiently informed affirmed that the wheat losses in 1940 were caused exclusively by rusts. We will now explain the form rust attack took in 1940 and also the damage caused in the different regions of the country.

In the regions where rust attack was the most severe, the phenomenon of scald due to physiological causes, was very marked and losses in wheat were as much as 50-70 per cent of the normal production. Wheat infested with rust and subjected to the excessive heat which followed the rainy period lost a much

greater quantity of water than healthy or slightly attacked grain and the nutrient substances of the leaves, stalks and grains were to a large extent consumed by the parasite.

Briefly, the poor crop in 1940 as also the poor quality of the wheat were due to physiological causes which brought about the phenomenon of scald, to which were added rust infestation, in particular black rust. The phenomenon of scald was more marked in regions where the rains caused lodging and where the wheat was caught by the excessive heat in the milky stage and also in the regions where the cereal was badly attacked by black rust.

The phenomenon of scald was more or less general; it showed, however, even in the same locality, an intensity varying according to the strain cultivated and the cultivation technique employed. The spring varieties ('Ulca', 'Arnaut') suffered more than the autumn varieties, late wheats more than early wheats; although there is no direct relation between the earliness of wheat and resistance to scald; *Triticum ferrugineum* suffered more than *T. erythrospermum*; awned wheat more than unbearded wheat; populations more than selected lines.

Among the selected lines of autumn wheat, 'American 15,' 'American 26,' 'Tighina 483,' 'Kooperatorea,' 'Hostianum' (I.A.C.R 4) were found to be the more resistant to scald. It should be pointed out that no wheat strain entirely resistant to scald has as yet been found, but the research work of plant breeders is being directed along these lines and it is to be hoped that their methodical and systematic work will lead to the solution of this important problem in wheat-growing especially in the steppe region.

The wheat suffered less when a good cultivation technique was employed summer ploughing followed in the autumn by surface ploughing, balanced quantities of seed per hectare, sowing carried out at the right time (end of September) and where there was no weed infestation.

Examining the causes of the very inferior quantity and quality of the 1940 wheat crop, the following practical conclusions may be drawn.—

(1) Unselected wheats should be replaced by pure lines.

(2) Selected wheat strains should be adapted to the different regions of the country; these strains should be established by the Institute for Agricultural Research of Rumania and indicated in the chart published by this Institute.

(3) The best wheats for Rumania with its extreme continental climate are not those giving high yields but those which are most resistant to cold, drought, scald and rusts.

For example, 'American 15' which has been so successful is not remarkable for its productivity, but chiefly for its resistance to inclement weather and diseases, assuring a balanced and consequently profitable production for a series of years.

(4) Cultivation operations (ploughing, harrowing, weeding, rotation) indicated by experimentation, should be strictly carried out and imposed on recalcitrant growers. In particular, special attention should be given to the uprooting of weeds which have again began to invade the fields.

(5) The Ministry of Agriculture with the assistance of the provincial organizations and local administrations should continue without cease the campaign for the destruction of the barberry (*Berberis vulgaris*) which in certain regions of the country (Prahova Valley, Carpathian Hills, Siret Valley, Danube Delta, etc.) forms veritable thickets.

The farmers do not realize the importance of the measure for the protection of wheat crops against black rust.

(6) Finally, for autumn sowing following scald years, it is recommended that a larger quantity of seed than usual per hectare be distributed in order to avoid eventual losses during germination and also those due to the dying off of weak seedlings through frost.

## *LEGISLATIVE AND ADMINISTRATIVE MEASURES*

**Germany.** — A Circular of May 11, 1941 defines what is meant by economic and industrial crop farming ('hochwertiges Handelsgewächs'), open land farming ('Freilandspflanzung') and measure of customary protection ('übliche Schutzvorrichtung'), terms of great importance when it is a question of paying or otherwise an indemnity to the farmer having suffered damage through game. (*Nachrichtenblatt für den Deutschen Pflanzenschutzdienst*, Berlin Anfang Juli 1941, 21. Jahrg., Nr. 7, S. 55-56).

*** A Decree of June 24, 1941 protracts hunting of the blackbird up to January 31, 1942. (*Ibid.*, Anfang August 1941, Nr. 8, S. 60).

*** An Ordinance dated June 28, 1941 introduces into the territory of the Government General provisions relative to the control of the diseases and pests of fruit crops analogous to those established by Decree of October 29, 1937 [see this *Bulletin*, 1938, No. 5, pp. 100-101]. (*Amtliche Pflanzenschutzbestimmungen*, Berlin, 1. August 1941, Bd. XIII, Nr. 6, S. 247).

**Germany** (**Alsace**). — A Decree of May 29, 1941 introduces into Alsace regulations analogous to those established by the Decree of July 1, 1938 relative to the control of the musk rat (*Fiber zibethicus*) [see this *Bulletin*, 1938, No. 12, p. 270]. (*Amtliche Pflanzenschutzbestimmungen*, Berlin, 1 August 1941, Bd. XIII, Nr. 6, S. 230-231).

*** Another Decree dated May 29, 1941 relative to the Colorado beetle [*Leptinotarsa decemlineata*] adopts measures analogous to those laid down for the Reich by Decree of April 22, 1941 [see this *Bulletin*, 1941, No. 10, pp. 186-187]. (*Nachrichtenblatt für den Deutschen Pflanzenschutzdienst*, Berlin, Anfang Juli 1941, 21. Jahrg., Nr. 7, S. 56).

**Germany (Protectorate of Bohemia and Moravia).** — By Notification No. 463 of February 24, 1941, the Minister of Agriculture publishes a list of the localities considered as 'prohibited zones' owing to the actual, suspected or close presence of the potato wart disease (*Synchytrium endobioticum*).

The export of potatoes and potato trash from prohibited to unprohibited zones is interdicted. The introduction of potato varieties non-resistant to wart disease into the prohibited zones is also interdicted. The cultivation of potato varieties other than those resistant to wart disease is prohibited. (*Amtliche Pflanzenschutzbestimmungen*, Berlin, 1. August 1941, Bd. XIII, Nr. 6, S. 248).

*** Decree No. 227, dated March 6, 1941, modifying Decree No. 133 of February 22, 1940 relative to the control of the potato wart disease (*S. endobioticum*) [see this *Bulletin*, 1940, No. 9, p. 166], establishes that railway trucks having been used for the transport of potatoes cultivated in a prohibited zone shall be disinfected with a solution of formaldehyde.

Beginning from March 1, 1945, the cultivation of potato varieties other than those resistant to wart disease will be prohibited. (*Ibid.*, S. 249).

*** By Decree No. 213 of April 30, 1941, relative to the control of grape phylloxera [*Dactylosphaera vitifolii*], the import and transit of vines and parts of vines (shoots, leaves, compost containing vine trash, etc.) are prohibited. This veto also applies to living phylloxera insects in any stage of development, as well as to all stakes, espaliers, etc. used in wine-growing.

The import and transit of grapes and grape marc are authorized provided that special precautions are taken against phylloxera. The regulations to be observed on the question are explained in detail. (*Ibid*, S. 250-251).

**Germany (Lorraine).** - A Decree of May 8, 1941 relative to the control of the Colorado beetle [*Leptinotarsa decemlineata*] comprises provisions analogous to those adopted on the question in the Reich according to the Decree of April 22, 1941 [see this *Bulletin*, 1941, No. 10, pp 186-187]. (*Nachrichtenblatt für den Deutschen Pflanzenschutzdienst*, Berlin, Anfang August 1941, 21. Jahrg, Nr. 8, S 60).

**Germany (Prussia).** - With a view to facilitating the control of the potato eelworm [*Heterodera schachtii*] in certain communes of the Schleswig District, a Decree of April 28, 1941 orders that in all agricultural and horticultural land measuring under 1000 $m^2$ notices shall be posted indicating the name and address of the usufructuary.

This provision does not apply to gardens and other land adjacent to habitations. (*Amtliche Pflanzenschutzbestimmungen*, Berlin, 1. August 1941, Bd. XIII, Nr. 6, S. 228-229).

*** A Decree dated April 29, 1941 relative to the control of scab [*Venturia*] requires the proprietors and usufructuaries of pip-fruit trees in Coblenz District to treat these trees with three sprayings: the first with Bordeaux mixture before

flowering, that is when the buds open; the second, with Bordeaux mixture or lime sulphur wash immediately after flowering when most of the petals have fallen; the third with lime sulphur wash two to five weeks after flowering.

The aforesaid mixtures or washes may be substituted by other means of control recognized as effective by the Plant Protection Service.

For the protection of bees, the spraying of open flowers is prohibited. Fruit trees placed less than 50 m. away from a beehive may only be sprayed in the evening when the bees have returned to the hive, or else in the morning before the bees come out; the beekeeper should be advised before spraying (*Ibid.*, S 227-228)

**Germany (Saxony).** - The Decree dated May 22, 1940 relative to the control of asparagus rust [*Puccinia asparagi*, see this *Bulletin*, 1940, No. 11, p. 215] has been suspended, owing to war conditions, for the duration of the year 1941 (*Amtliche Pflanzenschutzbestimmungen*, Berlin 1 August 1941, Bd XIII, Nr. 6, S 251)

**Belgium.** - By Decree of August 29, 1941 the provisions of the Decree, dated May 15, 1941 relative to the destruction of sparrows [see this *Bulletin*, 1941, Nos 7-8, p 143] are prorogated up to September 15 inclusive. (*Moniteur Belge*, Bruxelles, 1er-2 septembre 1941, nos 244-245 p 5854)

**Colombia.** — Decree No 671 of April 3, 1941 comprises measures for the improvement and sanitary protection of crops in the banana zone of Santa Marta, Magdalena Department. (*Diario Oficial*, Bogotá, 22 de abril de 1941, año LXXVI, núm 24641, pág 252).

⁂ By Decree No. 691 of April 15, 1941 has been created and attached to the Ministry of National Economy, the technical Agricultural Board. The Chief of the Plant Protection Service has been called upon to take part in the said Board. (*Ibid.*).

**France.** - A Ministerial Decree passed at Paris on February 18, 1941 establishes that the cultivation of potatoes in gardens or isolated plots is only authorized for early varieties, the list of which is decreed by the Director of Agricultural Services. The digging-up of the potatoes grown under these conditions will be carried out on a date fixed by the Director of Agricultural Services.

The cultivation of potato varieties other than those indicated in the aforesaid list is only authorized in fields or allotments designated beforehand by the mayor of the parish. The sites will be determined in such a way that the crops, for each district, will be grouped in a very small number of localities.

The lay-out of the fields suggested by the mayor will be submitted beforehand for approval to the Director of Agricultural Services who may make any modifications he may consider necessary.

Because of the insecticidal treatments which have to be given, the cultivation of potatoes together with other food crops for man and livestock is prohibited.

All growers of potatoes are required to search for the eventual presence of the Colorado beetle [*Leptinotarsa decemlineata*] on their crops.

As soon as any grower ascertains the presence of the Colorado beetle, he must advise the mayor who will notify the Director of Agricultural Services immediately on the first discovery.

All growers of potatoes must destroy the eggs, larvae and adults as soon as they appear on their crops, first by thorough collecting by hand, then by arsenical treatments.

The mayor, with the assistance of the Association for plant protection, organizes control measures in the parish. To this end, he will form prospection and collection squads which must work at least one afternoon a week, beginning from the first discovery of the insect or, at the latest, from May 15. These squads will be composed of all interested parties, unemployed and schoolchildren

All potato fields must be thoroughly inspected each week. Adult insects, egg-masses and larvae will be collected and carefully destroyed. This operation should be continued up to June 15.

All potato crops must be given at least two sprayings of washes of lead arsenate, lime or alumina. Late varieties should be given three treatments. If serious infestation occurs, the grower is required to carry out supplementary treatment

The dose of the arsenate preparation will vary according to the arsenic content of the product selected; the minimum quantity will be 1 kg. per hectolitre water for diplumbic arsenic containing 11 per cent. arsenic, or 500 g. for calcium arsenate having 25 per cent. arsenic.

Insecticidal dusts in place of sprayings are only authorized in cases determined beforehand by the Director of Agricultural Services.

In each parish, the mayor, assisted by the president of the Association for the control of crop pests (or the Colorado beetle), must ascertain, in agreement with the Director of Agricultural Services, that the necessary quantities of insecticides and sprayers indispensable for control operations will be available and close at hand to the farmers in good time. (*La Pomme de Terre Française*, Lille, juin 1941, 4ème année, n° 24, p. 6-7).

*** Another Ministerial Decree passed at Vichy on April 3, 1941 renders the control of the Colorado beetle compulsory throughout the territory. (*Ibid.*, p. 7).

*** An Interministerial Decree also passed at Vichy on April 4, 1941 regards the working expenses of the Associations for the control of crop pests. (*Ibid.*).

**Italy. — By Law No. 924 of July 25, 1941, has been transformed into Law the Royal Decree-Law No. 412 dated May 15, 1941 modifying the customs duties on potassium and sodium cyanides [see this *Bulletin*, 1941, No. 9, p. 164). (*Gazzetta Ufficiale del Regno d'Italia*, Roma, 11 settembre 1941, anno 82°, n. 215, p. 3596).**

*** By Law No. 1042 of July 25, 1941 has been transformed into Law, with modifications, the Royal Decree-Law No. 230 dated April 11, 1941 relative to the production of citric acid for the preparation of anticryptogamic products [see this *Bulletin*, 1941, No. 6, p. 119]. (*Ibid.*, 2 ottobre 1941, n. 233, p. 3912).

**Morocco (French Zone of).** — The Dahir of November 21, 1940 (20 chaoual 1359) modifying the Dahir of December 17, 1935 (20 ramadan 1354) [see this *Bulletin*, 1936, n° 5, pp. 107-108] establishes that Art. 1 of this last Dahir is to be modified as follows: 'Syndical Associations may be formed for the permanent control of plant parasites, such as are defined in Art. 1 of the Dahir of September 20, 1927 (23 rebia I 1346) [see this *Bulletin*, 1936, No. 5, p. 108] regulating the supervision of the health conditions of crops in the French Zone of the Sherifian Empire'. (*Bulletin Officiel*, Rabat, 3 janvier 1941, XXX° année, n° 1471, p. 4).

*** Vizirial Decree of November 21, 1940 (20 chaoual 1359) abrogates the Vizirial Decree dated March 17, 1936 (23 hija 1354) [see this *Bulletin*, 1938, No. 8, p. 179] enumerating the plant parasites for the control of which syndical associations may be formed. (*Ibid.*, p. 11).

*** A Decree of the Director of Waters and Forests, dated December 24, 1940, authorizes the destruction of rabbits causing damage in various regions of the French Zone of the Sherifian Empire. (*Ibid.*, 10 janvier 1941, n° 1472, p. 31).

*** Another Decree of the same Director, dated January 9, 1941, authorizes the destruction of rabbits causing damage to crops and plantations in certain zones of the post of civil control of Sefrou (Fès). (*Ibid.*, 24 janvier 1941, n° 1474, p. 73).

*** A Decree of the Director of Agricultural Production, Trade and Supplies, dated January 13, 1941, fixes the fee for cost of fumigating plants or plant products intended for export. (*Ibid.*, p. 72-73).

*** Two Decrees of the same Director dated February 22, 1941, establish, *inter alia*, that all consignments of dried figs and raisins presented to the technical examining board for the export of Moroccan products, must be accompanied by a fumigation certificate issued by the district plant protection inspector, who will have seen to the execution of fumigation operations; this officer must also seal each consignment, (*Ibid.*, 28 février 1941, n° 1479, p. 225-226).

*** A Decree of the same Director, dated May 15, 1941, empowers the establishment of the Tamelelt Syndical Assocition for the control of plant parasites [see this *Bulletin*, 1941, No. 10, p. 189]. (*Ibid.*, 6 juin 1941, n° 1493, pp. 643-644).

*** A Vizirial Decree of May 17, 1941 (20 rebia II 1360) modifies the Vizirial Decree of May 17, 1933 (22 moharrem 1352) [see this *Bulletin*, 1933, No 9, p. 207] fixing the rate of the fee for the cost of sanitary inspection for the import of plants, parts of plants or plant products into the French Zone of the Sherifian Empire (*Ibid.*, 13 juin 1941, nº 1494, p. 654).

*** A Decree of June 20, 1941 provides that the inspection certificates relative to consignments of fresh vegetables and alimentary floury substances other than those which have to conform to a certain standard, as well as the certificates appliable to consignments of truffles, beets and mushrooms, must state, *inter alia*, that the merchandise inspected is free from internal or external living parasites, defects or diseases damaging their presentation or conservation (*Ibid.*, 11 juillet 1941, nº 1498, p. 724-725).

*** By Decree of the Director of Agricultural Production, Trade and Supplies, dated July 4, 1941, the disinfection of export consignments of potatoes attacked by the potato moth [*Phthorimaea operculella*] is rendered compulsory.

Disinfection will be carried out according to the conditions established by Decree of January 13, 1941 [see above] fixing the tariff for fumigation cost of plants or plant products intended for export (*Ibid.*, 18 juillet 1941, nº 1499, p. 753).

*** A Decree of the Director of Agricultural Production, Trade and Supplies, dated August 2, 1941, gives application to the Resident's Decree of April 7, 1941 regulating the production of seed potatoes in Morocco and trade in said seed potatoes.

Potatoes of Moroccan origin, transported, put up for sale, sold or ceded for the purpose of seed should, *inter alia*, be obtained from crops exempt from degenerative symptoms. (*Ibid.*, 22 août 1941, nº 1504, p. 863-864).

*** By Decree dated August 4, 1941, the French Zone of Morocco is declared invaded by the desert locust [*Schistocerca gregaria*]. (*Ibid.*, p. 864).

**Rumania.** — Decree-Law No 1.251 of May 6, 1941 modifies and supplements Article 73 of the Law relative to the organization and support of agriculture. In certain instances as established by the Minister of Agriculture and Domains, this Article renders compulsory the control of plant diseases and pests as also the destruction of crows' nests. (*Monitorul Oficial*, Partea I-a, Bucureşti, 7 Mai 1941, anul CIX, nr. 106, pag. 2428-2429).

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INTERNATIONAL BULLETIN
OF PLANT PROTECTION

## DISCOVERIES AND CURRENT EVENTS *

**BRAZIL.**

### Plant Diseases Observed in the State of São Paulo in 1939 and 1940 †

As a continuation of the earlier list referring to the years 1937 and 1938, published in this *Bulletin* (1940, No. 2, pp. 25-27), the following is a list of the diseases of cultivated or useful plants studied at the Laboratory of Plant Pathology of the Institute of Biology, São Paulo in 1939 and 1940. The diseases reported in the previous lists (see also this *Bulletin*, 1937, No. 12, pp. 269-275 and 1938, No. 3, pp. 49-53) again observed in 1939 and 1940 are not reported.

The determination of the parasites and diseases listed has been effected by the author of this communication together with the assistants of the aforesaid Institute: Messrs R. Drummond Gonçalves, S. C. Arruda, J. G. Carneiro, S. Gonçalves Silva and B. Pickel. The *Cercospora* were for the most part classified or confirmed by Prof. C. Chupp.

| | |
|---|---|
| SUGARCANE (*Saccharum officinarum* L.) | *Himantia stellifera* Johnson. |
| QUINCE (*Cydonia vulgaris* L.) | *Cercospora cydoniae* Rangel. |
| COTTON (*Gossypium* sp.) | *Colletotrichum gossypii* var. *cephalosporioides* Costa. |
| DAHLIA (*Dahlia variabilis* (W.) Desf.) | *Entyloma dahliae* Syd. |
| BROAD-BEAN (*Vicia faba* L.) | *Uromyces fabae* (Pers.) De By. |
| FIG (*Ficus carica* L.) | *Fusarium moniliforme* J. L. Sheldon. |
| PERSIMMON (*Diospyros kaki* L.) | *Colletotrichum gloeosporioides* Penz. |
| SWEET POTATO (*Ipomoea batatas* L.) | *Cercospora alabamensis* Atk. |
| PECAN (*Carya illinoensis* (Wang.) Koch) | *Cercospora fusca* (H. and W.) Rand. |

* Under this and the next heading the countries are arranged in French alphabetical order.

† Communication from the official correspondent of the Institute, Mr AGESILAU A. BITANCOURT, Assistant Director of the Institute of Biology, Ministry of Agriculture, Industry and Commerce of the State of São Paulo, São Paulo, Brazil.

| | |
|---|---|
| APPLE (*Pirus malus* L.) | *Fabraea maculata* Atk. |
| RAMIE (*Boehmeria nivea* Gaudich.) | *Cercospora krugiana* Müller and Chupp. |
| ROSE (*Rosa* spp. cultae) | *Peronospora sparsa* Berk. |
| TOBACCO (*Nicotiana tabacum* L.) | *Botryobasidium solani* (Pr. and Del.) Donk. |
| TOMATO (*Solanum lycopersicum* L.) | *Fusarium bulbigenum* Cke and Mass. var. *lycopersici* (Brushi) Wr. and R.<br>*Phytophthora infestans* De By.<br>*Bacterium lycopersici* Burg. |
| GRAPEVINE (*Vitis* spp. *cultae*) | 'Coup de pouce'<br>Physiological cause. |
| *Achras sapota* L. | *Elsinoë lepagei* Bitancourt and Jenkins. |
| *Amaranthus hybridus* L. | *Albugo bliti* De By. |
| *Ambrosia polystachya* DC. | *Elsinoe ractii* Bitancourt and Jenkins. |
| *Anona* spp. | *Colletotrichum* sp.<br>*Elsinoë anonae* Bitancourt and Jenkins. |
| *Asclepias curassavica* L. | *Puccinia concrescens* E. and E. |
| *Bauhinia* sp. | *Uromyces dietelianus* Pazschke. |
| *Blechnum serrulatum* Rich. | *Elsinoë blechni* Bitancourt and Jenkins. |
| *Bixa orellana* L. | *Cercospora bixae* Allesch. |
| *Boehmeria caudata* Sw. | *Elsinoë boehmeriae* Bitancourt and Jenkins. |
| *Calea pinnatifida* Less. | *Elsinoë caleae* Bitancourt and Jenkins. |
| *Caryophyllus aromaticus* L. | *Cephaleuros virescens* Karst. |
| *Cissus sicyoides* L. | *Schizonella colemani* Iyen and Nar. |
| *Cordia sellowiana* Cham. | *Elsinoë costai* Bitancourt and Jenkins. |
| *Euphorbia pulcherrima* Willd. | *Cercospora pulcherrima* Tharp. |
| *Fimbristylis annua* var. *diphylla* Roem. and Schlt. | *Cintractia axicola* (Berk.) Cornu. |
| *Oncidium varicosum* var. *rogersii* | *Hemileia oncidii* Maubl. and Rogers. |
| *Myrocarpus fastigiatus* Allem. | *Septobasidium saccardinum* (Rangel) Marchionatto. |
| *Phyllocalyx laevigatus* Berg. | *Caudella psidii* Ryan. |

| | |
|---|---|
| SONCHUS OLERACEUS L. | *Septoria sonchi* Sacc. |
| TALISIA ESCULENTA Radlk. | *Elsinoë arrudai* Bitancourt and Jenkins. |
| TOURNEFORTIA spp. | *Elsinoë talisiae* Bitancourt and Jenkins. |
| TRIUMFETTA SEMITRILOBA Jacq. | *Cercospora triumfettae* Syd. |
| VERBENA BONAIRENSIS L. | *Elsinoë verbenae* Bitancourt and Jenkins. |

## *LEGISLATIVE AND ADMINISTRATIVE MEASURES*

**Germany.** — A Decree of August 27, 1941 gives the list of the provisions regarding plant protection, the validity of which has been extended to the eastern regions reunited to Germany on October 8, 1939. (*Amtliche Pflanzenschutzbestimmungen*, Berlin, 1. Oktober 1941, Bd. XIII, Nr. 7, S. 258-260).

*** Another Decree of the same date regards the protection of the eastern regions reunited to Germany against the introduction of the diseases and pests of cultivated plants.

The importation of conifers (genera *Abies*, *Picea*, *Pinus*, *Pseudotsuga* and *Tsuga*) elms (genus *Ulmus*), Canadian poplar (*Populus canadensis*) as also of carnation rooted plants and cuttings is prohibited.

Other plants and plant products, to be authorized for importation, should be accompanied by a phytosanitary certificate of origin testifying that the consignments in question are free from certain pests and diseases. Cherries, for example, should be free from the San José scale [*Aspidiotus perniciosus*] and the apple maggot [*Rhagoletis pomonella*], potatoes free from wart disease [*Synchytrium endobioticum*], etc.

§ 5 indicates the decrees and provisions regarding the control of grape phylloxera [*Dactylosphaera vitifolii*] which will be applied to the regions in question.

Experts for phytosanitary inspection will be nominated by the Minister of Agriculture. (*Ibid.*, S. 260-263).

**Germany (Lorraine).** — A Decree of September 5, 1941 adopts measures corresponding to those established in the Reich on October 29, 1937 and January 6, 1938 for the control of fruit pests and diseases [see this *Bulletin*, 1938, No 5, pp. 100-101 and No. 6, pp. 124-125]. (*Nachrichtenblatt für den Deutschen Pflanzenschutzdienst*, Berlin, Anfang Oktober 1941, 21. Jahrg., Nr. 10, S. 76).

**Germany (Ostmark).** — A Decree of August 28, 1941 comprises the provisions regulating the sale of pest control preparations containing thallium. (*Amtliche Pflanzenschutzbestimmungen*, Berlin, 1. Oktober 1941, Bd. XIII, Nr. 7, S. 264-265).

**Germany (Sudeten Territory).** — A Decree of July 25, 1941 requires the proprietors and exploiters of apple-trees of any species including stocks not yet grafted, to control the woolly aphis (*Schizoneura lanigera* = [*Eriosoma lanigerum*]).

The regulations established in this respect, also dated July 25, 1941, are as follows:—

In the autumn or on winter days without frost the branches and all other parts of trees with cankerous growths must be removed and destroyed by fire.

The trunks and large branches should be carefully scraped and brushed in order to discover the colonies of woolly aphis and to be able subsequently to coat these parts with linseed oil or any other control product regognized by the Plant Protection Service as being effective. If necessary, the upper part of the roots should be cleared of earth and dusted with lime, tobacco powder or treated with some other preparation recognized efficacious. The wounds caused by these treatments should be closed up with grafting wax or neutral vegetal tar.

The colonies which may eventually appear in spring must be immediately destroyed by any suitable control measure officially recognize as efficacious. The colonies which may form during summer on the trunk or branches will be treated in the same way. Should the occasion arise it will be necessary to have recourse to spraying. (*Amtliche Pflanzenschutzbestimmungen*, Berlin, 1. Oktober 1941, Bd. XIII, Nr. 7, S. 265-267).

**Germany (Westmark).** — By Decree of September 1, 1941 relative to the control of the European corn borer [*Pyrausta nubilalis*] the producers of maize seed living in a district where the control of the corn borer has been made compulsory, are required, on harvesting the ears, to cut the maize stalks as far down as possible and to destroy them or utilize them in such a way as to guarantee thorough destruction of the caterpillars of this pest which they may contain, for example by using them as forage or for ensilage. It is prohibited to plough under maize straw or to use it for covering over stacks of potatoes, etc. The cobs should be sold immediately for industrial utilization or else destroyed by fire. (*Amtliche Pflanzenschutzbestimmungen*, Berlin, 1. Oktober 1941, Bd. XIII, Nr. 7, S. 267-268).

**Argentine Republic.** — Ministerial Resolution No. 19.202 of March 1, 1941 establishes the control measures to be employed against 'vinal' (*Prosopis ruscifolia*) conformably to the provisions of Decree No. 85.584 of the same date [see this *Bulletin*, 1941, Nos. 7-8, p. 143]. (*Boletín Oficial de la República Argentina*, Buenos Aires, 15 de julio de 1941, año XLIX, núm. 14.069, pág. 3).

*** Decree No. 95.233 of July 8, 1941 authorizes the 'Junta Reguladora de Granos' to destroy the 1939-40 maize crop, belonging to the State, if considered of no use or as constituting a dangerous focus for the propagation of crop pests. (*Ibid.*, 17 Julio de 1941, núm. 14.071, págs. 3 y 4).

**Belgium.** — A Decree dated October 10, 1941 establishes, *inter alia*, that in the regions considered suitable for the production of seed and seedlings grown under control, the General Office for the control of agricultural and horticultural seed and seedlings may employ protection measures and may impose the eventual destruction of plants the proximity of which constitutes a danger to the maintenance of healthy condition and purity of the varieties subjected to its control.

The General Office may authorize the cultivation of seed plants subjected to its control outside the aforesaid regions provided that to the seed or seedling growers are applied special measures which would be necessary for the protection of the health condition and purity of the seed and seedlings controlled.

The General Office communicates to the burgomasters of the communes concerned the names and addresses of the producers whose crops are subjected to its control and protection.

At the same time the said Office indicates the protection measures to be employed. (*Moniteur Belge*, Bruxelles, 15 octobre 1941, nº 288, p. 6828).

*** A Decree of October 15, 1941 regulates the sale of insecticides, fungicides, weedicides and all parasiticidal products whatever in general, intended for the prevention and control of plant diseases and pests.

These products can only be sold, held for the purpose of sale, offered in sale, transported for the purpose of sale or exchange, after preliminary authorization granted by the Secretary General of the Ministry of Agriculture and Supplies, on certain conditions which he decides for each product such as it is described. All products authorized for sale are registered by the State Section of Phytopharmacy at Gembloux.

For the products at present obtainable on the home market, provisional sales permits will be granted, as a transient measure, up to December 31, 1942.

The official list of authorized products will be published regularly in the *Moniteur Belge*.

This regulation is not applicable to goods passing through the country nor to those intended for export, when the consignments in question are accompanied by documentary way-bills. In warehouses, etc., the goods intended for export should be clearly labelled 'Export Product'.

The Secretary General of the Ministry of Agriculture and Supplies establishes the methods of analysis for the products subject to this regulation. (*Ibid.*, 23 octobre 1941, nº 296, p. 7001-7005).

**Chile.** — Decree No. 49 of January 24, 1941 prohibits the dispatch to the South of Antofagasta of all plant material in the natural state, originating in the zone comprised between the northern limit of the country and Antofagasta inclusive, with the exception of certain specified products. (*Diario Oficial de la República de Chile*, Santiago, 25 de febrero de 1941, año LXIV, núm. 18,897, pág. 638).

**Colombia.** — By Decree No. 1123 of June 20, 1941, the 'Superintendencia Fomento Agrícola del Magdalena' created by Decree No. 671 dated April 3 of the same year, will function under the supervision of the Ministry of National Economy.

The Division for the control of Sigatoka disease [*Cercospora musae*] will be incorporated in the new organization.

The 'Superintendencia', *inter alia*, will deal with the organization and management of the national Bureaux relative to research work and studies on and official treatment for diseases as well as the supervision and control of treatments effected by private individuals or enterprises with which the Government will have come to an arrangement in the matter, and also the supply of apparatus and material.

The campaign against Sigatoka disease will be carried out by the national Government in the plantations at present subjected to official treatment, on the following conditions:

(1) that, according to the opinion of the technicians of the 'Superintendencia', treatment would be justified economically taking into consideration the situation and probable production of the plantation;

(2) that the person concerned assures in favour of the Government the payment of the debt he owes in compensation of the services rendered him for the protection of his plantation.

The Government will contribute to the extent of 55 per cent. of the value of anticryptogamic products and other material necessary for accelerating the campaign for the control of Sigatoka disease, and also the total value of the costs involved in the organization and technical operations of the campaign.

The planter in whose favour the protection measures are carried out, will contribute to the extent of 45 per cent. towards the cost of anticryptogamic products and other material employed and also to the total expenses of day-labourers and to the management of control operations in his plantation according to the quota established for the use of the gangs which will be supplied to him.

With a view to facilitating extension of the campaign or assisting towards the upkeep of the existing plantations, the Government may grant to those banana-growers who so desire and whose plantations are situated in the zone under treatment, in accordance with the terms of the contract drawn up between the national Government and the Magdalena Fruit Company, the necessary loan to cover the amount they have to contribute towards the campaign or for the protection of their plantations.

The loans which may be enacted from the State by the banana-grower in the control of Sigatoka disease and those which the planter will contract with the Government in the future, will be covered or guaranteed by the value of his sales of bananas, not subjected to embargo, or all prizes for output or other future benefits.

The 'Superintendencia' will regulate the expiration or annulling of the contract in force between the Government and the 'Cooperativa Bananera del Magdalena' relative to the campaign for the control of Sigatoka disease. The

funds and material in possession of this organization, according to the clauses of the said contract, will be given up to the ' Superintendencia '. (*Diario Oficial*, Bogotá, 25 de junio de 1941, año LXXVII, núm. 24693, págs. 1019 y 1020).

*** Decree No. 1124, of the same date, fixes the total amount for the expenses of the said ' Superintendencia ' for the period from July 1 to December 31, 1941. (*Ibid.*, págs. 1020 y 1021).

**Italy.** — By Ministerial Decree of October 12, 1941 the wild rabbit [*Lepus* (*Oryctolagus*) *cuniculus*] is included among the animal pests of the territory of the Province of Ravenna. (*Gazzetta Ufficiale del Regno d'Italia*, Roma, 17 ottobre 1941, anno 82°, n. 246, p. 4137).

**Rumania.** — By Resolution No. 1.129 of the Council of Ministers, dated September 15, 1941, bunt (*Tilletia*) has been declared an infectious disease damaging to wheat.

All farmers who intend sowing wheat during the crop year 1941-42 are required to treat the seed with copper sulphate or any chemical preparation recognized and authorized by the Ministry of Agriculture and Domains. (*Monitorul Oficial* (Partea I), București, 22 septemvrie 1941, anul CIX, nr. 224, pag. 5642).

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